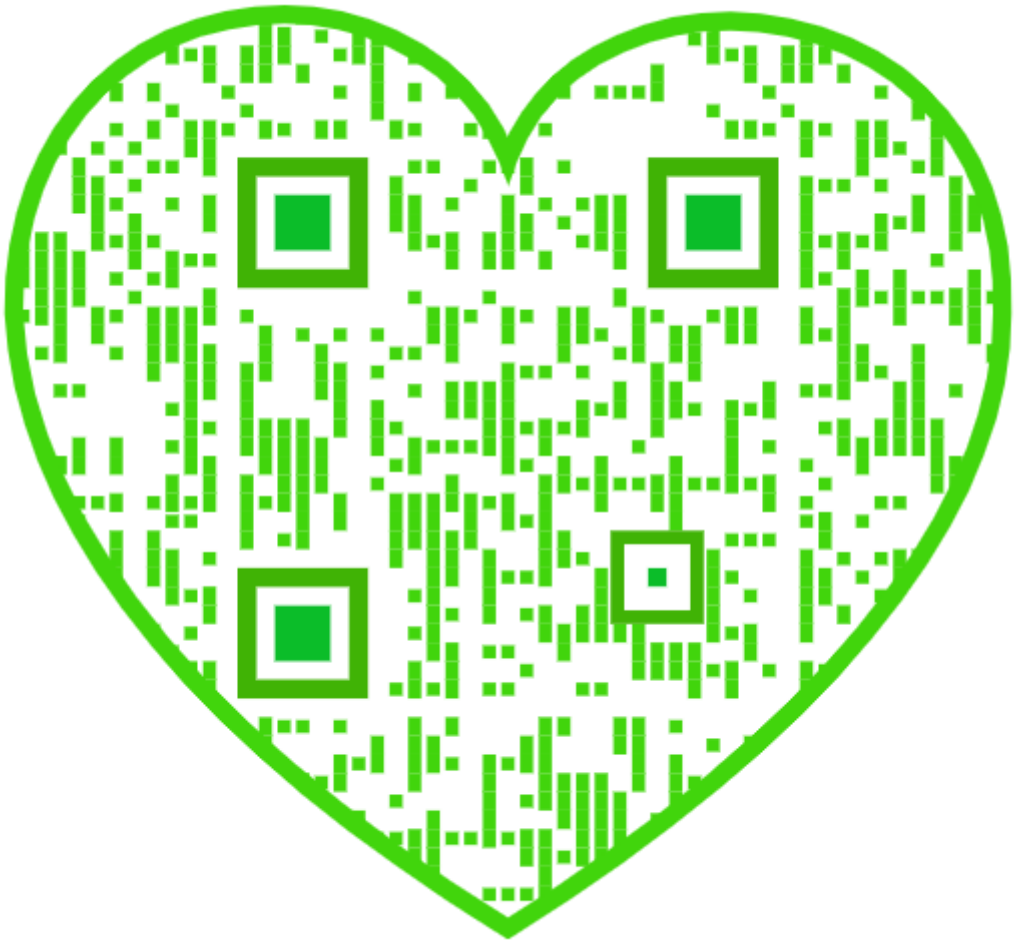

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COL. CASEY of the Engineer Corps, Mr. Hill, the Supervising Architect, and Mr. Clark, the Architect of the Capitol, were the Commission appointed by the President after the fire in the Patent Office to inquire into the security of the public buildings against fire (*see American Architect*, No. 93). Their report was submitted to the President, and by him referred to Congress just before the holidays. Of the Capitol, they say that it is mostly of fire-proof construction, but the roof of the old building immediately about the dome is of wood, and the space under it is used for storage of books and documents, the ceiling below being also of wood. A fire in this part of the building might endanger the colonnade of the dome. In the libraries of the Senate and House the galleries, shelves, and cases are of wood. The Treasury, Post Office, and Patent Office are mostly fire-proof; but in the Treasury the file-room over the eastern colonnade has a wooden floor on wooden joists, and all the old part of the roof is sheathed in wood, coppered. All that remains of the roof of the Patent Office and part of that of the Post Office are wooden, and in both buildings are combustible ceilings. In the basement of the Treasury, moreover, are a cabinet-maker's and a carpenter's shops, and store-rooms of inflammable material. The new State Department is of fire-proof material throughout, excepting only the doors, and the boarding of the floors, which is laid in concrete. The War and Navy Departments, the Printing Office, and the buildings in which various bureaus of the War and Treasury Departments are forced to find lodgings for want of room at home, are pretty much all combustible. The buildings of the Naval Observatory are of ordinary construction, with scarcely any protection, "old and too much worn to be susceptible of being remodelled into fire-proof structures." They add that:—

"Generally the public buildings not of fire-proof construction, and used for office purposes, are much endangered by the character of their contents. The files, cases and boxes, books, papers, etc., belonging to the several departments of the Government, have accumulated to such an extent as to crowd the spaces provided for them, and a fire fairly under way would be difficult to control. Workshops of various kinds are also connected with some of the buildings, in which are kept materials of a combustible character, thus contributing to the causes of disaster."

THE Commission recommends specific improvements in the various buildings, replacing combustible material by incombustible, the removal of dangerous contents and stores of combustible materials, and the supply of pipes and hydrants where there is need. They advise the building of a fire-proof observatory, and suggest the removal of the Bureau of Engraving and Printing from the Treasury. Of one proposition which has been set before them, they say wisely:—

"The number of papers is increasing rapidly, and in the consideration of the care and preservation of the files this Commission has met with the suggestion that many of the papers could well be destroyed. After a careful examination of this question, we do not consider it advisable to recommend this course with any of the records, however unimportant they may appear. Every paper worthy at any time to be recorded and placed on the public files may be of value at some future time, either in a historical, biographical, or pecuniary way, to the citizen or the nation. Papers seemingly of the least importance have been connected with the proof of false demands against the Government; and it is scarcely possible to arrive at a decision of what is important to be preserved, and what is useless to be destroyed."

They consequently recommend that a special fire-proof building be put up for the archives of the Government, where all papers that are not needed for frequent reference can be filed away, to the relief of the file-rooms in the departments. By way of general suggestions they say:—

"Very little can be done without further legislation to insure greater security against fire. More stringent police regulations, with adequate apparatus, and the changes herein recommended, will contribute in a measure to this end; but the great danger is to be found in the structural character of the buildings themselves, and the changes necessary to remedy this can only be made after authorization by Congress. In the opinion of the Commission, only fire-proof materials and fire-proof methods of construction should be permitted in important structures now being or hereafter to be built for public use. It is respectfully recommended that Congress be asked to grant the authority to carry out such of the recommendations of this report as may meet the approval of the Executive."

THE quarrel between the commissioners of Cook County, Ill., and the common council of the city of Chicago, over the new combined Court House and City Hall, which has for two years past been a fruitful source of comment in these pages, has now assumed a new phase, disgraceful and expensive to that city, but interesting and picturesque to all outside observers. Our readers may remember that after a ludicrous complication of competitions the opposing parties failed to agree upon an architect, and solved the difficulty in an original way by appointing two, one in the interest of each party. Before long the architects themselves fell out, the main point of controversy being the erection of a dome upon the dividing line between the two halves of the building. The county commissioners, who insist upon the adoption of this feature, or as much of it as can be built upon their side of the line, have pressed on their part of the building with haste, and are now making ready for the dome; the city authorities on the other hand have apparently got but little farther than their foundations, but these have been laid upon a different principle, and do not contemplate making a dome, which is stoutly repudiated as an invention of the enemy. The two halves of the building are therefore conceived on totally different plans; and, moreover, the county half is built upon piles with foundations capable of sustaining a load of ten tons to the square foot, while the city half is built without piles and is capable of bearing about one-fifth of that weight. At length a new and inconveniently conscientious member of the Board had the happy thought of asking the county attorney whether the city has a right to construct its portion without the dome provided in the designs of Mr. Egan, the architect of the commissioners. The opinion of this official is by no means conclusive or comforting to the Board, and now a serious dilemma is presented: if the city wins, the county must demolish work which has cost $70,000; if the county succeeds, a large part of the work already done on the city side will be worse than wasted, the plans of Mr. Tilley, the architect of the city half, must be fundamentally altered, and a very large bill of expenses must inevitably follow. Both parties have passed resolutions declining the appointment of expert committees of investigation, and so the matter stands. If fraud and incapacity must needs have a monument, a half dome would perhaps be as appropriate as any other form unknown to art.

A NEW theory for the cause of the destruction of the Greenfield candy-factory in New York has been suggested, and seems by the newspaper accounts to have found more favor than it deserves. In the loft of the building adjoining on the east, one story higher than the Greenfield building, a large amount of wool was stored,—over three hundred thousand pounds. The buildings were both old and weak, it is said; and that on the other side of the candy-factory, being two stories lower, gave it no lateral support. The theory is that the pressure of the wool upon the Greenfields' party-wall forced their building over sideways, and so threw down its unbuttressed west wall upon its lower neighbor. This strikes

us as a very unreasonable explanation. The explosion, to which there seems to be convincing testimony, might, it is true, have followed the fall instead of occasioning it; but it is difficult to see how the weight of the wool could have had any such effect as is suggested. The wool could not exert the lateral pressure of a fluid, and so if the building yielded to it, this must have been by casting over bodily to one side, like a house of cards. In this case both buildings would have fallen together, which they did not. Moreover the side wall of the Greenfield building must have fallen all at once and let down the floors which it carried; whereas it is in evidence that persons were seen running back and forth in the upper stories for some minutes after the first explosion. This is confirmed by the testimony of Baecko, the machinist, who, after the explosion had thrown out a portion of the west wall, went to the windows on that side and looked out toward Greenwich Street, upon the roofs of the adjoining building.

A leading article in the *Architect* of Dec. 15, discussing the question of originality in modern art, asks, in view of the copyism which infects the English art of the day, whether new countries are more successful in original art than old, and — what many people, and Americans especially, are in the habit of asking — whether Americans are developing, or show an aptitude to develop, any new phase of art. Its conclusion is that "neither in painting, in sculpture, nor in architecture and the decorative arts, does America furnish the slightest evidence of being able to strike out a new path." The *Architect* gives a not very flattering picture of the condition and prospects of art in the United States, which it takes as the best example of what may be expected in art from the new countries of the world. It takes its cue especially from architecture, of which it says what perhaps is true in modern civilization, though certainly not in older times, that it is "after all probably the best of all tests of any thing like public artistic aptitude of a high order;" being apt to lag behind the other arts in appreciation. "Accordingly," it says, "what we find in America is a good deal of national taste for poetry, and not much less for music, a very moderate knowledge at the best of painting and sculpture, and in respect of architecture a remarkably simple condition of things. There are a goodly number of *big* buildings, but the grand dome of Washington, like that of St. Petersburg, is built upon a secret skeleton of cast-iron. It is not to be denied that Gothic spires of deal, painted and 'splashed' in imitation of granite, or in some other way made to resemble any thing but the true material, are everywhere characteristic monuments. In the great parliament-houses of the several States, the style of design is generally some very showy and feeble rendering of what we call bastard Italian. The country houses, such as they are, can only be designated in fairness as questionable reproductions of the suburban villas of London. Here and there a European-bred native architect, or a European immigrant, can make a creditable copy of a Gothic church. But beyond such efforts no one seems able to venture." It adds that, "on the whole, American architecture most certainly exhibits in practice, certain endeavors after that originality which we have heard so much called for in theory; but all such endeavors are in effect frantic and undisciplined, and the more they are novel are the less artistic."

It is not so easy even for an American to find out just what is the condition of American architecture. The country is wide, its cities far apart, and changing very rapidly in aspect. Buildings cannot be carted about for exhibition like pictures and statues; and one must be at some pains, and travel a good many thousands of miles, to get a general view of what its buildings are. For a representative view it is different; and two or three cities looked at with some care might give a pretty fair idea of what our tendency is now. But the question occurs, What is a representative view? If it is an average view, the picture which the *Architect* draws is not very far wrong. Into our average goes a vast amount of work designed by persons who are not architects at all, or by architects whose skill is of the slenderest, and most of it done anywhere from ten to thirty years ago. But if one is to judge the tendency of our architecture, the things to look at are those that are doing now, the things that are done by men who are in the front rank, and who are moving first in the direction in which the mass are following. Of most of these things there is no record. The illustrated journals, our own included, do not give any adequate idea of them; and travellers cannot be expected to keep up with them. Twenty years ago, or even less, it was probably true that wooden Gothic spires, painted like stone, were characteristic monuments. They are still built more or less by ambitious builders, or architects in country towns; but they are banished from work of any pretension to consideration, and have altogether ceased to be characteristic. Our state-houses, which certainly are nothing to boast of, are all things of the past, except those which are of the future. The truth is, that the last ten years, we might almost say the last half-dozen, have altogether changed the character of our building. A person who was familiar with Chicago or Boston six years ago might be hopelessly lost in them to-day, so far as his recollection would serve him. In Boston he might imagine himself in a different country, but it would be neither England nor France. It is true that there is a great deal of confusion of style, and a considerable lack of style, in our new work. It borrows rather recklessly from all sides, and it is difficult enough to tell to just what it is tending; but it is very far from being mere reproduction of what is done abroad, and the best of it is by no means frantic in its deviations.

On the question of originality, we have said something in another part of this paper; the essential inquiry to any one who cares to judge of the prospects of architecture in the United States is, what progress have we made in the ten or twenty years during which we have been actively building; and nobody who is here to see can deny that the progress is very great, — great enough to make the future hopeful for excellence if not for originality. Our first architects have not the acquirement nor the firmly disciplined power of the first architects of the leading cities of Europe; but they would take good rank anywhere. Our public buildings are far below the European standards; our better churches are, with a very few exceptions, decidedly inferior to the English, and the same may be said, on the whole, of the exterior architecture of our country houses. Our best and most characteristic work has been in domestic and street architecture, for this has been our chief need and so our chief study. The planning of our dwelling-houses, especially of city houses, has been altogether revolutionized in a dozen years. Americans adhere to the English habit of living in separate city houses, and so far as our opportunities allow us to judge — we may be as imperfectly informed as the *Architect* is, or the writer in the *Revue Générale*, about American architecture — the planning of city houses is distinctly less successful and skilful in England than here. As for street architecture, our best is not as good as the French; but we are inclined to think it is as good as the English or the German, and it is not a copy of either of these, though influenced perhaps by all. But these comparisons are fruitless, since absolute excellence, and not relative, is the one important thing. The trouble is, the best is an unduly small part of the whole, and the interval between the best and the ordinary is much more conspicuous than in older countries; but perhaps where there is progress, this interval is a pretty satisfactory index of it.

On the whole, the promise of American architecture seems to us encouraging enough. Whether we are to lead the world into new paths or not, we need not stop to consider: we are certainly not ready for it yet. We have faults enough, — ostentation, self-confidence, impatience of restraint, and thus far little discipline or acquirement; but we have also inventiveness, independence, straightforwardness, and apparently a fair share of native artistic sense. At present, unluckily, consistency is not a part of our plan: until it is, we cannot hope for the best result. No people ever went far in art — or in any other pursuit — except by a united effort in a common direction. Till our architects learn to work together better than they do now, we are not likely to accomplish any thing great: but this is one of the respects in which we are improving. A great drawback to our success is our impatience of criticism, both from each other and from outside.

The strictures of foreigners, even the more dispassionate, have been wont especially to stir us into an unnecessary indignation, that made us blind to what value they might have. So long as we consider it an affront and evidence of personal hostility to point out the faults of our work, we shut ourselves out from one of the surest means of bettering it. It will be well for us when we are able to give and receive correction among ourselves with truth and soberness; and we can always afford to take note of what competent outsiders say of us, and pay heed to whatever of truth we can find in it, without inquiring too curiously into the respectfulness of their attitude or the fulness of their appreciation, which is more their concern than ours.

ORIGINALITY IN AMERICAN ART.

ENTHUSIASTIC friends of the United States have always called upon her to lead the way to a new day in art, and this century had hardly opened before the cry for a national literature and a national art was raised at home; nor has it yet ceased to be heard above the clamor of business and politics. Architecture has been especially singled out as a fitting subject for originality. Long before means were provided for instructing our architects in any kind of design, they were exhorted to attack a difficulty which the best-trained of our day in any country have not yet fully succeeded in mastering. Recipes of Indian corn, and we know not what other decorative material, were showered upon them, and an abundance of abstract ideas, moral, social, and political, thrust forward for concrete expression in architecture by eager laymen. The outcome of these aspirations has not been great, for fortunately architects have been too busy learning their business to pay much heed to them. Whatever has been accomplished in giving an individual character — and a good deal has been done lately in an unambitious way — has been done, as all architectural progress is made, by simply studying to meet the natural exigencies of use and construction as they grew, while the more aspiring efforts that have been made have borne less fruit in improvement.

Without stopping for the moment to discuss the fairness of the account of our architectural condition to which we have alluded elsewhere, we may say with regard to all the expectations or prophecies of, and exhortations concerning, an original art in our new country, of which we have heard so much, that we believe they are all wrong, and for the present not pertinent. We do not believe in the exhibition of infant phenomena, individual or national. A new country is exactly the wrong place to look to for originality in any pursuit which is the fruit of development and special training, most of all in art. New countries are not peopled by artists, nor by men who have the leisure or the means to encourage art; but by men who have their living to get. Their first generations are busy subduing their land and providing for their subsistence. Whatever artistic faculty they inherit lies dormant meanwhile, and deteriorates from disuse; so that when they reach the point where leisure and wealth allow of the serious study of art, they have a long leeway to make up, and recommence at a disadvantage. Art requires continuity of development as much as science, and its development is even slower. The people who have gone aside to colonize a new country must be contented, when they rejoin the moving current of progress in art, to take a place behind that which they left. They have a certain advantage of fresh interest and a starting-point outside of prejudices; but the disadvantage of aptitudes rusty with disuse, broken traditions, paucity of examples in art, and absolute lack of means of training. To count first on originality under such circumstances is unreasonable in outsiders: it is mischievous in the people themselves, for what they need is steady training without temptation to vagaries.

So far as we see, only two kinds of originality are possible in art. One is the originality which begins with no acquirement or habit; develops its own forms and methods in native experimental ways. This is the originality of barbarous art; it is simple, naïve, and in the hands of an apt people always has a charm of its own. It is manifestly impossible in any people which has the appliances of civilized life. It has nevertheless been attempted in our day, or something more like it than the practitioners would be willing to confess, in the efforts of doctrinaires and enthusiasts to produce decoration, furniture, and even architecture by the light of nature alone, while yet they cannot divest themselves of the habits they owe to the art of another kind, by which they are always surrounded without having mastered it. The result is the originality of the sophisticated savage, who uses beads for his money, and hangs a pair of boots about his neck for ornament. The other kind of originality, the only kind which is possible or desirable in a high civilization, is that of thoroughly trained artists, whose skill is cumulative, advancing step by step from the mastery of old forms to the development of new. In this case changes of form, though they may be rapid, are never discontinuous. They are not the product of undisciplined effort, but the fruit of men's labor whose power is the accumulation of generations. Such fruit ripens slowly. It took hundreds of years to produce either Greek or Gothic architecture, and that after the chief productive energy of whole peoples had been directed to art. It is true that no civilized people has to start from the very beginning as those did, and that the long work of those centuries was not the invention of forms so much as the education of a community; but this also is a part of our work, and now the greater portion of our energy is turned in other directions.

Moreover, we doubt the value of a search after originality beyond the natural desire to avoid the trite and commonplace, with which the customary is not to be confounded. It is something like the search for happiness: that kind which is found by hunting it for its own sake is not likely to be worth much when it is got. Novelty for the mere sake of novelty — and this is what the cry for originality amounts to — always seems purposeless and therefore feeble. Most of all is this true in architecture, an art to which every great development hitherto has had an obvious and convincing reason. It is an art which embodies so much virility and directness of purpose that motiveless changes of it are an offence. All real originality in it has resulted from modification of the conditions of life, or from the influence of new materials in construction, — joined with the spontaneous action of a national instinct in design, itself a thing of long growth, the result of numberless consenting tendencies, and not to be resisted or changed, unless in extraordinary circumstances, by individual effort. Changes in art which are due to this instinct have the dignity and authority that belong to the steady irreversible movement of a whole people or of an age. In the present time, the adaptation of new materials is undetermined; the conditions of modern life are in a state of flux; general instinct of design there is none; and national instinct for art, at least in a new country, is not likely to take shape till there is some fixity in the other influences. Under these circumstances our changes are only likely to be what they have been through this century in England and America, — mere vacillations of fashion, expressive of nothing, suited for millinery, but unworthy of a serious art whose works are to outlast the lives of men.

To a young nation then, as to a young artist, one may safely say: It is much more important that your art should be good in its kind than that it should be original. Have no fear lest, after you have acquired a mastery of expression, if you have any thing to say, you shall be backward in saying it. Therefore be in no haste for originality, but learn the mastery of expression in art, by learning to control the elements and combinations that are ready to your hand. Discipline your power by working with the material of whose successful use you have examples before you. Then when you have acquired a trained sense and a sure hand, a safe mastery of form, proportion, and combination, if you have time left, and ideas of your own that want expression, devote yourself to being original; or better, to expressing them as straightforwardly as possible, and you will be original enough. If you have not, leave it to your son or your grandson, who, by virtue of his inheritance beginning where you left off, may with equal strength climb to heights which you could not reach. As for America, her artistic activity is a thing of one generation. A generation counts for little in the development of art, — for very little when the whole shaping of a national instinct is involved. No nation ever pursued art with a persistent and thoroughly earnest interest, that did not in the end produce an art original enough, for such an interest is the index of aptitude. We cannot suppose that Americans, if they really show such an interest, will fail of individuality in their art; but there is no need to be in a hurry.

PAPERS ON PERSPECTIVE.

In compliance with the wishes of my friends and pupils, and in fulfillment of a promise made more than a year ago to the editors of the *American Architect and Building News*, I propose to furnish to its readers, from week to week, a series of papers upon Perspective. A new treatment of so old a theme would be uncalled for, but that even the more elaborate treatises are deficient in comprehensiveness and scientific simplicity, while the practical hand-books fail to make the reader acquainted with methods that are found in experience to be the most convenient and practical of all. Most of what I shall have to say is of course, in substance, an old story: but it is a story which can, I think, be told anew with profit, so as the better to lead up to the chapters that are comparatively new. That I have any thing to offer which is absolutely new, that I have in my explorations found any field absolutely untrodden by my predecessors, I can hardly suppose: I am too used, in these regions, to discover the footprints of unknown or forgotten pioneers in what I had taken to be really *terra incognita*. But I am sure that if the reader will accompany me he will come to some things that, if not absolutely novel, are new to him, and that he will reach some points of view from which the more familiar ground will present an unaccustomed aspect.

This discussion of the subject will differ from that generally given, in several particulars; much greater prominence being assigned to the phenomena of parallel planes than is usual, and use being made of the laws thus established to determine the perspective of shadows,—a subject that seems hitherto to have received but little attention.

In the course of this investigation it will be shown that the horizontal plane hardly deserves the paramount importance commonly assigned to it, and that the practice of referring all constructions to that plane is productive of needless inconvenience. The well-known method, also, of points of distance, or points of measures, which is generally treated as an auxiliary method of but limited serviceability, will be shown to be of universal application, and to suffice for the solution of almost all problems. The development of this method to its legitimate results leads to the construction of a perspective plan, rendering unnecessary the construction of the orthographic plan, by the aid of which perspective drawings are commonly made.

Any treatise on perspective is, of course, mainly directed to meet the wants of the architect; and the problems with which he deals are free from most of the perplexities that constantly annoy the student of nature. But there are difficulties and apparent anomalies which confuse the mind even of the architectural draughtsman, in disposing of which we shall also be able to explain the discrepancies which are always found to exist between sketches made faithfully from nature, and drawings made according to the common perspective rules,—discrepancies which have naturally produced among artists a certain disregard and contempt for the rules themselves. It will be shown, as indeed hardly needs to be pointed out, that in drawing from nature, one works, in fact, not upon a plane, but upon a cylinder. The discussion of Plane Perspective needs to be supplemented, then, by a chapter on Cylindrical, or, as it is sometimes called, Panoramic Perspective, and an explanation of the principles and rules of this method will show its results to be exactly conformable, in kind, to those reached when drawing merely by the eye. Much that I shall have to say will thus be as pertinent to the work of the landscape painter or the historical painter as to that of the architect.

Finally we will briefly review some ingenious methods of limiting the space required for making drawings in perspective, especially that of the late M. Adhémar; methods of the greatest value when, as in fresco-painting or scene-painting, the picture is large compared with the size of the room in which it is to be made. To this I hope to add some historical notes, showing the gradual development of the art, and of the scientific ideas on which it is based.

W. R. W.

I.—THE PHENOMENA OF PERSPECTIVE.

1. A drawing made *in perspective* undertakes to represent objects of the shape and size that they actually appear from a given point. It has to do only indirectly with their real shape and size, being mainly concerned with their apparent outlines and dimensions. Before trying to learn how to draw them, then, it is obviously desirable to find out how they really look. This first paper will accordingly be taken up with considering the *appearances* of things, the *phenomena* with which perspective has to do.

2. The *things* in question, as always in the scientific study of form, are lines, especially straight lines; plane figures, especially rectangular figures and the circle; and solid objects, especially the sphere and cylinder. The appearance of solids bounded by plane surfaces is determined, of course, by the aspect of the plane figures that bound them.

3. Certain phenomena in regard to the shape and size of these things are sufficiently obvious. It does not need to be pointed out that every thing seems smaller—that is to say, subtends a smaller visual angle—when at a distance from the eye than when near; that consequently the more distant portions of a straight line seem smaller than equal divisions near at hand; that in rectangular figures the farther sides occupy less space to the eye than the nearer sides, so that they present, in most positions, a trapezoidal rather than a rectangular aspect, the sides inclining towards one another; that a circle when seen in perspective generally appears as an ellipse, and that the centre of the circle does not occupy the centre of the ellipse, but is nearer to the farther than to the hither edge. These *qualitative* determinations are easy enough. But it is not so easy to determine the relations of *quantity*, to tell *how much* smaller a given distance will make a given line appear, or just at *what* angle the sides of the rectangle seem inclined, and in what direction they seem to run. To determine these things with exactness is the chief object of these methods,—an object to be reached through the study of another class of phenomena, the appearances not of limited and finite lines and planes, but of lines and planes supposed to be indefinitely extended. Indeed, finite lines and planes are in perspective considered merely as portions of the indefinitely extended lines and planes in which they lie.

4. All lines lying in one and the same direction, and consequently parallel to each other, are said to belong to the same *system* of lines. Each line is an *element* of the system.

In like manner, all planes parallel to one another, and whose *axes* accordingly belong to the same system of lines, are said to belong to the same *system* of planes. Each plane is an *element* of the system. By the *axis* of a plane is meant any line at right angles, or perpendicular, to it.

The position of the spectator, that is to say, of the spectator's eye, is called the *station point*.

Now if we imagine the lines of any system to be indefinitely extended both ways, we shall encounter the following phenomena.

5. All the lines of a system, that is, all lines parallel to each other in space, seem to converge towards two infinitely distant points. These points are called the *vanishing points* of that system of lines. They are 180° distant from each other.

The vanishing points of a line are the utmost possible limits of its apparent extension, even though infinitely extended. For a straight line, although infinitely long, cannot subtend an arc of more than 180°; it cannot seem more than a semicircle.

The beams of the sun, or the shadows of clouds, at sunset, which seem to separate overhead and converge near the opposite horizon, afford a capital instance of parallel lines with two vanishing points. So also do parallel lines of cloud, and, in streets, the lines of sidewalks, eaves, and house-tops. They appear as great circles of the sphere of which the eye is the centre.

6. Now what is very curious is that whichever element of the system one looks at seems straight; the others, on both sides, seeming concave towards it. The horizon itself, which seems straight when one looks at it, seems curved if one looks up or down. Other horizontal lines, when regarded with reference to the horizon, seem parallel to it, and farthest removed from it, where they are nearest the eye, approaching it at a constantly increasing angle as they retreat towards their vanishing points.

These singular phenomena, though constantly before our eyes, are little noticed, and consequently but little known. But they sometimes force themselves upon the draughtsman's attention, causing much confusion in his drawing and in his mind. The fact that most straight lines, all indeed except one, always seem curved, is the basis of the method of curvilinear or panoramic perspective, which will form the subject of a subsequent paper.

7. Either vanishing point of any system of lines may be found by *looking* in the direction followed by the lines of that system; the vanishing point will then be seen full in front of the eye.

That element of the system which passes through the eye, or station point, will be seen *endwise*, the line appearing as a point, coinciding with and covering the vanishing point, which is at its farther extremity.

8. All the planes of a system, that is, all planes parallel to each other in space, seem to converge towards an infinitely distant line, which is the limit of their apparent extension. A plane, though seemingly infinitely extended, like the sea, cannot subtend an arc of more than 180° in every direction; it cannot seem more than a hemisphere. Its limiting line accordingly will be a great circle of the infinite sphere, of which the eye, or station point, is the centre.

9. The vanishing trace of any system of planes may be found by glancing along that plane of the system which passes through the eye. On looking in any direction at right angles to the axis of the system of planes, it is seen full in front of the eye. That element of the system of planes which passes through the eye is seen *edgewise*, the plane appearing as a line, covering and coinciding with the vanishing trace, or horizon, of the system, which is its outer extremity.

Such a line is the horizon, which limits at once the plane of the earth, and the plane, or hemisphere, of the sky. We might call such a line the *vanishing line* of a system of planes, just as we speak of the vanishing point of a system of lines; but as it is common to call any indefinitely extended right line a vanishing line, it is more convenient to borrow a term from Descriptive Geometry, and speak of the *vanishing trace* of a system of planes. Or we may borrow another word, and speak of the *horizon* of a system of planes, distinguishing the real Horizon, or vanishing trace of horizontal planes, by a capital **H**.

10. Any point or line lying in a line passing through the eye seems exactly to cover and coincide with the vanishing point of the

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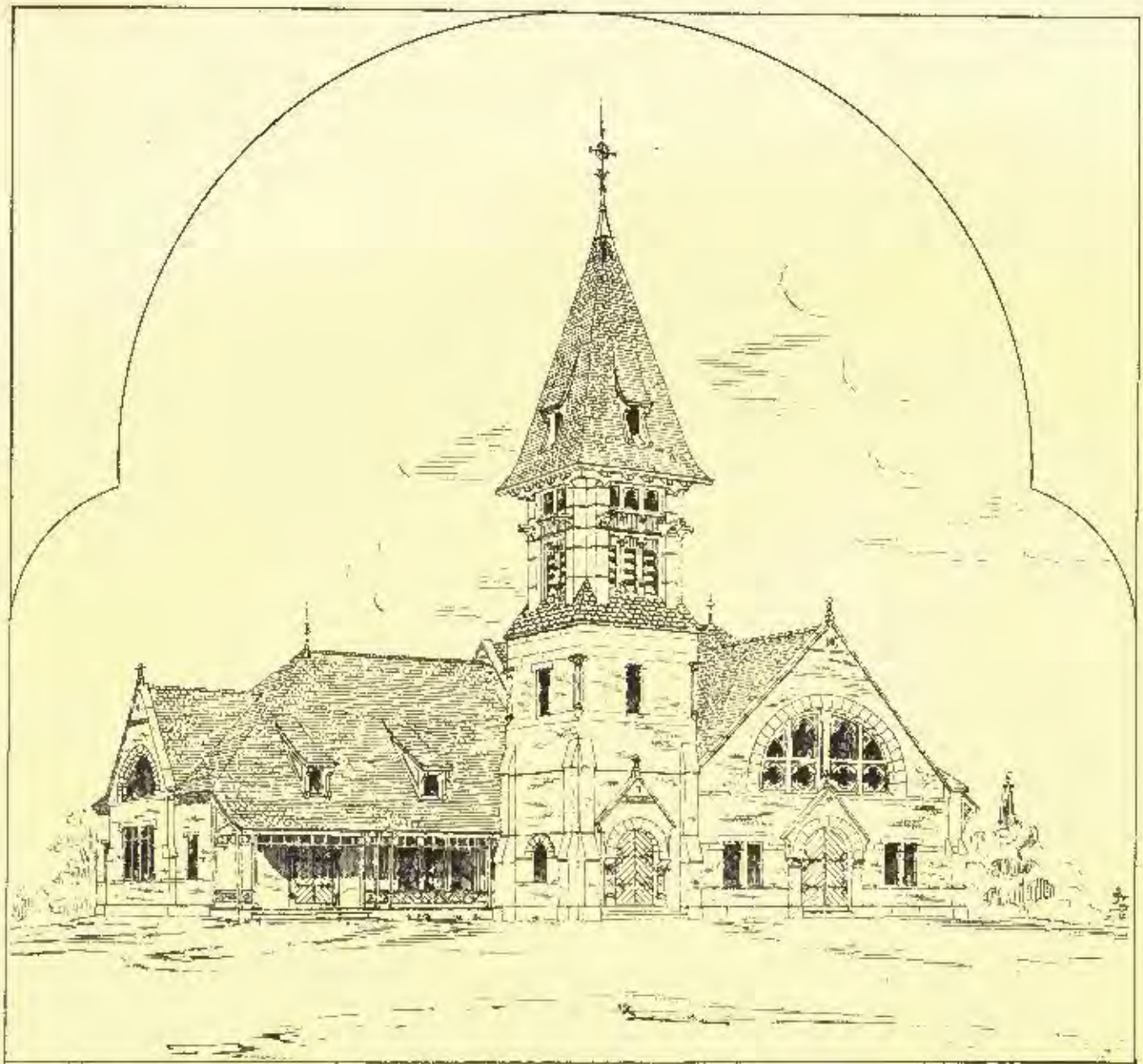

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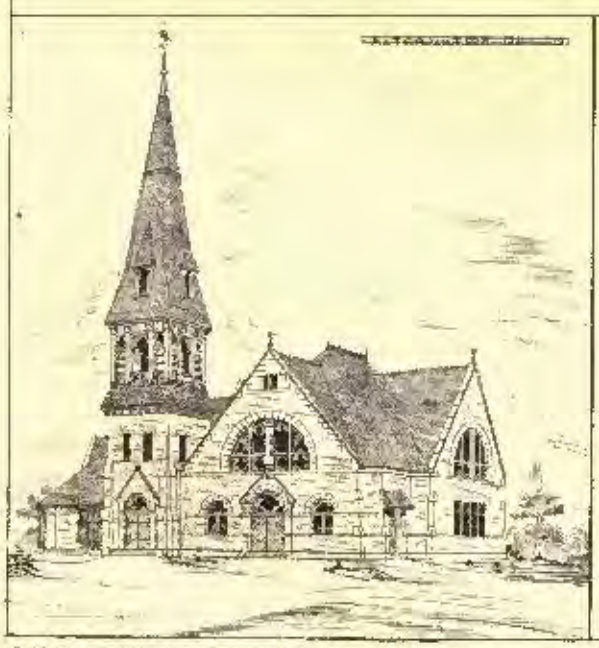
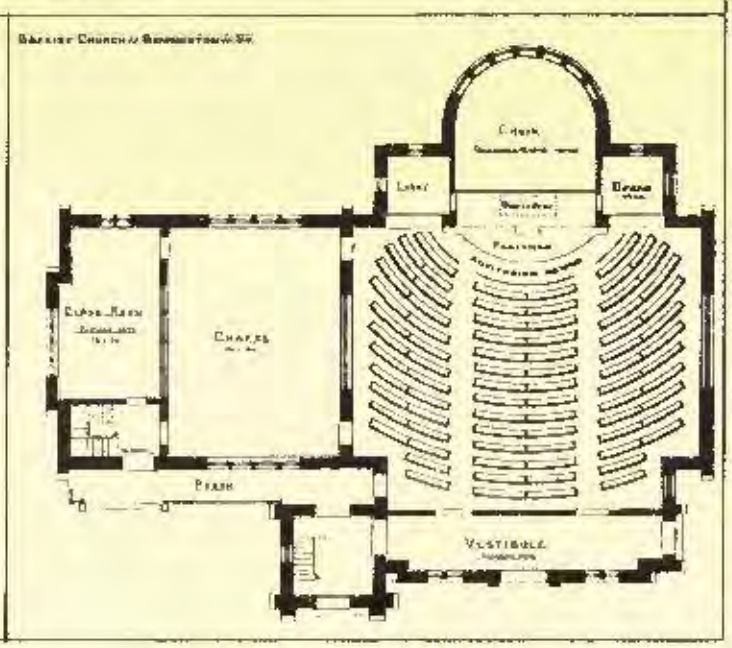
ARTHUR VINAL, ARCHT.





system to which the line belongs. So also any line, figure, or surface, lying in a plane passing through the eye, appears as a right line, and seems to cover and coincide with a portion of the trace of the system to which the plane belongs.

11. Vanishing points and vanishing traces have to do only with the *direction* of lines and planes, not with their *position*. Hence objects whose lines and planes are parallel have the same vanishing points and traces, whatever their position to the right or to the left, above or below the spectator.

12. A plane surface upon a solid object cannot be seen unless it is on the side of the object towards the trace of that plane.

13. It is obvious that all systems of horizontal lines have their vanishing points in the Horizon, and conversely, that the Horizon passes through the vanishing points of all systems of horizontal lines. The same is true, of course, of vertical or inclined planes, and the lines that lie in them or are parallel to them. From these considerations we can frame the following propositions, which are the fundamental propositions of our system of perspective.

(*a*) All lines, or systems of lines, lying in or parallel to a system of planes, have their vanishing points in the trace or horizon of that system.

Conversely: —

The trace, or horizon, of any system of planes passes through the vanishing points of all lines parallel to them.

(*b*) The traces of all the systems of planes which can be passed through a line, or parallel to it, in any direction, pass through the vanishing point of the system to which the line belongs, and intersect each other at that point.

Conversely: —

A line, or system of lines, lying in or parallel to two planes, has its vanishing point at the intersection of their traces.

Hence: —

(*c*) *The trace of a plane passes through the vanishing points of any two lines lying in it, that is, of any two elements of the plane.*

(*d*) *A line lying in a plane has its vanishing point in the trace of that plane.*

(*e*) *The line of intersection of two planes has its vanishing point at the intersection of their traces.*

14. The reader is recommended to take the pains not only to satisfy himself of the truth of these propositions, which he will easily do, but also to verify them by examples, determining for himself, in his daily walks, at what distant points in the earth or the sky the vanishing points of different lines are to be *looked* for, lines horizontal, vertical, or inclined; and in like manner to trace the *horizons* of the different planes he encounters in roofs or walls, exemplifying these propositions over and over again until they become perfectly obvious and familiar.

The vanishing points of the eaves, for example, and of the raking cornice or other steepest line of a roof, are easily found by *looking* in the directions they pursue. These two directions determine the inclination of the plane of the roof in which they lie, its trace, or *horizon*, is a great circle, or straight line, cutting across the sky from one of these vanishing points to the other. In the case of two intersecting roofs, the vanishing point of the hip or valley that marks their intersection is found at the intersection of their horizons.

15. The discussion of a problem in perspective cannot be considered complete until the vanishing point of every line, and the vanishing trace of every plane, has been determined.

THE ILLUSTRATIONS.

ROSENBORG CASTLE, COPENHAGEN, DENMARK.

ROSENBORG CASTLE, of which we give an illustration, is one of the very few buildings of architectural interest, that repeated destructive conflagrations have left in the city of Copenhagen. It was built in the early part of the seventeenth century by King Christian IV., who used it for a summer residence, situated as it was, at the time of erection, only a short distance outside the city walls. A few years later, the fortifications were extended so as to enclose Rosenborg within the city limits, and finally the rapid growth of Copenhagen made it necessary a few years ago to demolish the earthworks, in order to give room for boulevards and streets which made this picturesque building with its surrounding park almost the centre of the Danish capital. The castle was formerly defended by walls, moats, and a draw-bridge, which have partly disappeared to be replaced by the more peaceful flower-gardens and lawns; and only a portion of the moat and the bridge remain to remind one of its fallen greatness. It is evident that the architect of this structure, Steenwinkel, must have been educated in Holland or northern Germany, as all his works, and they are many, bear a strong resemblance to buildings in Amsterdam, Leyden, and Hanover; so much so, that "Dutch Renaissance" has become a generally accepted term in Denmark, for the style of architecture they represent. The castle is built of brick; and the four bay-windows as well as cornices, belts, and window-casings, are made of sandstone. The roofs are all covered with rather wide strips of copper. It is by no means a beautiful architectural creation, but its eccentric gables and numerous carvings in unexpected places do not lack a certain grace, which, together with the time-softened red color of the bricks, streaked with yellow-tinted sandstone, and the greenish copper roofs which are enlivened by gilt finials and vanes, make a cheerful and pleasing *ensemble*. The building has not been inhabited for many years, but is used as a depository for many important state documents, and for an invaluable collection of rare gems, gold and silver ware, etc., the property of former members of the royal house. The first story, which is entered through doors hardly three feet wide, by little more than six feet in height, is cut up into a number of small rooms, very cosey and homelike, but hardly what might be expected would satisfy royalty. Some of these rooms are loaded with carvings and paintings, and contain a great many interesting pieces of furniture, made famous by their connection with important events in the history of the kingdom. The second story is also divided up into rather small rooms; one of which is decorated in a peculiar style, the walls, ceiling, and centre of the floor being completely covered with mirrors; and another room is finished in dark wood, highly varnished, and inlaid with a profusion of precious stones and pearls. The third story consists of one large hall, occupying the entire length and width of the main building, with ante-rooms, etc., in the towers. The walls of this hall (Hall of the Knights) are hung with twelve pieces of tapestry, representing battles on land and sea, and other historical events. This tapestry was all made in a small town a few miles from Copenhagen. One end of this vast room is occupied by the royal throne, and the opposite end by the baptismal font, wrought in silver and gold. The whole castle has recently been repaired and restored, and makes a very pleasing feature in a city otherwise poor in interesting architecture.

ST. MARY'S FREE HOSPITAL FOR CHILDREN. MR. HENRY M. CONGDON, ARCHITECT.

This design contemplates the alteration and enlargement of the present building, which is an ordinary city dwelling. An adjoining lot of twenty-five feet width has been purchased for this purpose. Provision is made for three wards containing sixty beds, with an isolation ward in cases of necessity. The basement contains reception ward, dining-room, kitchen, laundry, etc. The first floor: reception-room, office, and sisters' dining-room, with pantries, etc., and one large ward for patients. The second floor provides two large wards for patients, with dining-rooms, ward-closets, etc. The third floor: sisters' bedrooms and infirmary, chapel, nurses' rooms, and store-rooms. The fourth floor: operating-room, isolation ward, servants' dormitory, children's play-room, and house-surgeons' apartments. There are also three good rooms in the attic. A central hall fifteen feet wide on each floor gives access to the different departments; and an elevator communicates with each floor from cellar to attic; while dumb-waiters run from the kitchen floor to the ward dining-rooms. The building is to be heated by steam, and ample provision is made for ventilation. The hospital is in charge of the Sisters of St. Mary. It is hoped that the work will be commenced in the spring of 1878.

BAPTIST CHURCH AT BENNINGTON, VT. MR. ARTHUR VINAL, ARCHITECT.

FIRE-PROOF CONSTRUCTION.

[A paper by Detlef Lienau, F.A.I.A., read at the Eleventh Annual Convention of the American Institute of Architects.]

THE effort to diminish danger by fire to our constructions is one of the greatest importance, and should enlist the energy and all the solicitude of our profession; and even more so in this country, where the difficulties occasioned by the influences of our climate are indeed vastly greater than in the countries of the Old World, from whence we are apt to take our precedents.

The large conflagrations to which many of our cities have lately been exposed have at least taught us this lesson: that the most destructible of our building materials is wood, and the least destructible brick. We should therefore, as much as possible, discard wood, and instead use brick for our principal building material. Among the many suggestions made after our large fires, there has not been mentioned one system of fire-proof vaulting, especially adapted for warehouses and some kind of factories, to which I beg leave to draw your attention for a few moments. This system, which is very common in the North of Germany, where it has existed since the Middle Ages, is well worthy of imitation, not only on account of its easy and practical execution, but also on account of its inexpensiveness. This vaulting consists of a series of strong elliptical arches, built parallel to each other across the building at intervals of say ten to twelve feet from centres: the spandrels of these arches are regularly built up to a level, and serve to support flat segmental arches turned between them. As a general thing the cellars in all buildings (dwelling-houses and others) are arched over in this manner; and in store-houses, breweries, distilleries, etc., you often find four or five stories, one above the other, arched over in the same manner. These buildings are built entirely of brick, and are often finished in this manner to the very roof, for which the arches are laid with the proper inclination, and then covered directly with cement, tile, or metal. With stairs of brick, stone, or iron, and enclosed in brick

walls, and having doors, windows, and shutters of iron, you have a construction as fire-proof as can be made, particularly adapted to storehouses, factories, or to cellars of dwelling-houses, and one not more costly, if as much, as the more modern system of wrought-iron beams filled in with brick arches. A fire from the outside cannot attack such a building vaulted over from cellar to garret, and a fire originating inside of it will in most cases be confined to the story in which it started.

Our system of wrought-iron beams filled in with brick arches, or arches of other fire-proof materials, has some great advantages: not the least one is, that it gives more available room on each floor, and that it requires less thickness of walls than the former system of all brick. But it is not as fire-proof on account of the exposure of the iron to the fire: this danger ought to be overcome.

In order to diminish this danger to the iron beams, a thick coat of plaster of Paris can be stuck to the under side of the beams for protection. For this purpose the arches may be started one-half inch below the lower edge of the beams, and this will give a coat of at least one inch thick the requisite support from and attachment to the arches.

To protect from the heat the end-beams at well-holes, also iron girders composed of two ⊢-beams, and to give them at the same time an inexpensive finish, I have lately used stout hoop-iron ($1\frac{1}{2}$ by $\frac{1}{4}$ inch), stretched and bound tightly and riveted around the beams and girders every eight inches from centres; the open channels at the sides of the beams are then filled in and built up with brick laid in cement. The hoop-iron keeps the bricks in their places till the cement has set; afterwards the sides and bottoms are plastered, and mouldings run on them if desired. If the girder-beams are far enough apart to allow the mason to reach with his hands inside, then the cavity between them is filled in with brick likewise. This device gives some considerable protection against heat in case of a fire, and has the advantage of not being costly.

For storehouses, factories, etc., where the danger of fire is greater, a good protection to cast-iron columns and wrought-iron girders might be built by enclosing the columns in brick piers. Suppose an 8" or 12" column: build an 8" wall around it; this would make a pier of 24" or 28" square. To protect the girders, turn, in direction of the same, from pier to pier 8" segmental arches 24" or 28" wide, the extrados of the same to touch the bottom of the girders; then level up the haunches, and build 8" dwarf-walls on each side of the girders to the top of the same. This will give an excellent protection against fire, and where it is most wanted in these kinds of buildings.

In most cases, a 4" instead of an 8" wall would be sufficient; but in extreme cases of storage of inflammable materials the 8" walls and arches would be necessary.

In all our buildings the effort should be to build with fire-proof materials, that is, with stone, brick, iron, and some of the plaster compounds for partitions and furring. Iron beams, which are the most costly of our materials, should be used as sparingly as possible, and we ought to calculate the strength required at every step of our building operation, so that no more iron may enter into our buildings than is absolutely necessary. In order to economize in the right direction, let us use as little wood as possible.

A French architect completes his buildings with less than one-half the amount of wood which we put into ours in the way of finish. The less wood we have in them, the less danger of compromising them in case of fire.

In the matter of roofing, there exists on the Continent of Europe a very safe kind of tile, which might well be adopted here. Not that new fancy tiling that has lately been introduced, and is not good for our purpose. The tile I mean is a plain rectangular tile, with a hook at the top to hook behind a wooden or iron lath, 13 or 16 inches long, 6 or 6½ inches wide, with a thickness of half an inch, which is laid 3 thick in mortar, showing 4 or 5 inches to the weather, and rendered underneath with cement or mortar; in other words, it is laid like slate. This tile roof can be laid at a pitch of three to four inches to the foot, and is not only a great security against fire, but also, when of the proper materials, a very lasting roof. When the sparing use of iron is advocated above, it is for the reason of reducing the cost of the iron construction, and in order to popularize the same. And that this can be done there is no shadow of a doubt. To put the beams as wide apart as their more or less length of bearing requires, would in many cases reduce the weight of iron to a very considerable extent.

The more we do in this direction, the nearer we come to the period when we can expect to have structures which will stand with credit an attack of fire from both the inside and the outside of the building.

CORRESPONDENCE.

THE EXHIBITION BUILDINGS. — THE USE OF ARCHITECTURAL MODELS.

Paris, Dec. 10, 1877.

It was a fortunate idea for the French to have planned a Universal Exhibition at a time of anticipated political disturbance, as it has served as an anchor to public interests amid the turbulent currents of politics. Although Victor Hugo, in his lately published "Histoire d'un Crime," sarcastically recounts how loud on all sides were the protestations of the absurdity and impossibility of a *coup d'état*, even up to the very eve of Napoleon's overthrow of the Republic in '51, still it is incredible, in view of the immense interests in the maintenance of order now at stake, that any party can think of attempting a movement which would render useless the vast works for the Exhibition.

The site of these works is almost ideal; and as the broad plain of the Champ de Mars, accessible on all sides, and covered with vast iron buildings, is appropriate for an exhibition of the world's commercial industries, so the noble stone edifice on the height opposite is most happily consecrated as a temple to the arts; for the Palais du Trocadéro, at first projected as only an accessory to the constructions on the Champ de Mars, is to remain a permanent museum.

A recent visit to these buildings shows every thing so advanced, that there is no doubt that all will be ready by the first of May. The works have been pushed with wonderful rapidity, and are about ready to receive the interior decorations, which are left to the charge of the exhibitors, whether nations or individuals. They have almost finished the giant iron skeletons of the two great vestibules which form the façades towards the Seine and the *Ecole Militaire*, and are placing in position the enormous plaster panels which form the ceiling. A great number of workmen have been for some time past employed in casting these panels, made of plaster with a large proportion of hemp, or some such material, to give them elasticity; for they are extremely thin and light, with no inner frame, and bend under their own weight without cracking. They fit into the iron web of the roof and form cupolas and saloons. It will be remembered, that the vestibules forming the end façades, 1,178 feet long and 82 feet wide, are connected together by, and give access to, nine galleries of exhibition. The largest of these are the two outside ones, forming the side façades, 2,145 feet in length and 115 feet in width, and destined for the machinery, which will be worked by motive-power generated outside the building. Not a spark of fire must therefore enter this gallery. The other galleries are to be devoted to raw materials, goods and furniture. The section of the Fine Arts is placed in the centre, and is interrupted to form a garden in the middle. This gallery, of stone to guard against fire, is isolated; and the avenues on either side will be interesting, for the different countries will decorate their sections upon it by their characteristic architecture. The only one of these façades yet completed is that of England, in brick and stone; and it is so ugly and contemptible, that one would pass it by without comment, did it not pretend to represent the fine old Elizabethan style. The United States is, they say, to be represented by a portable house.

The principal difference between this building and that of 1867 is that the latter was elliptic in form, while the new one, by the same architect, M. Hardy, is rectangular; and though containing some 792,000 square feet, while the building of 1867 contained only 504,000, yet the vestibules have this time been made so much more spacious, and the Art Section three or four times larger, the exhibition space is thus reduced to nearly the same area. The French section comprises one-half the building, and it is perhaps a pity, since as it is divided from the other nations by the Art Gallery and avenues, its exhibitions cannot be so easily compared. The iron construction is the simplest possible, with no attempt at ornamentation, as it will be entirely hidden by the various decorations. The building can have no pretensions to beauty, but its immense size and huge corner pavilions will give it a certain dignity, and then the traditional flags may do something for it.

The park in front, along the Seine, is already laid out with trees, fountains, and grottos, which are covered with ivy, and contain stalactites cleverly imitated in carbonate of lime, which look as if formed there a century ago, instead of a week.

Crossing the river to the Palais du Trocadéro, the case is different, and architectural criticism can be more exacting. The design is by MM. Davioud and Bourdais, who were supposed to have been chosen in a competition, but who, it is whispered, had no anxiety beforehand about the result; for wire-pulling is as powerful in Paris as anywhere, and M. Davioud is not the man to suffer from the fact.

The building has little resemblance to the design submitted in the competition, for no time was lost in profiting by the clever ideas of the less fortunate competitors. On the whole, the effect is fine of the great central circular theatre, or concert-hall, with lofty towers, and flanked by semicircular portions, which have a development of some 1,320 feet in length. Nearer approach shows many features, however, open to criticism. M. Davioud has what is commonly called "good taste," and designs charming little details, his capitals and mouldings being generally designed with much delicacy and refinement; but with this will be joined, as in his fountain St. Michel, gross faults of scale and proportion, some of which are here already apparent.

As M. Davioud is the architect of the fountains in Paris, he has allowed himself the luxury of designing something in which he may be supposed to be most at home; and in front of the building is to be an enormous fountain and cascades, to surpass those at St. Cloud and Versailles, and to cost 650,000 francs; the latter fact more probable than the former.

M. Mercié, the first of the modern French sculptors, and author of "Gloria Victis" and the "Génie des Arts" just finished for the entrance to the Louvre, has modelled a winged "Fame" nearly twenty feet high, to be cast in brass, which is to surmount the main building, making this the highest point in Paris. A rough cast from the model is to be placed in position, to allow the sculptor to judge of its effect. The figure itself, they say, is superb in its pose, but to judge it fairly, it must be first raised to its lofty pedestal. So thoroughly understood in France is this *desideratum*, that no time nor expense are spared to accomplish it. Models in plaster are made of all important details, that the architect may not be misled by his drawings; and this considerable expense is taken as a matter of course. Probably in the United States it would be thought preposterous to permit the delay and expense of raising the model of this statue to the pinnacle of the roof, merely to gratify the whim of a distrustful sculptor. "If he thinks he can't make it right the first time, we will find somebody who can," would be the comment of the committee. But the difficulties of art are better appreciated here. Not long ago M. Vaudremer, architect in charge of the churches of Paris, was intrusted with designing brackets and candelabra for lighting St. Eustache. After the work of several months, a full-sized design was completed; and from this a plaster model costing 1,000 francs was carefully made. On being set up in the church, it appeared too small to the fastidious architect, and it was thrown aside, to be replaced by an equally careful model a little larger; the item of the 1,000 francs for the first model being set down as one of the necessary incidental expenses, without thought of remonstrance from the givers of the candelabra. The whole set are now mounted; and it may appear less surprising to our "happy-go-lucky" architects, that not only in the conscientious labor spent on them, but in their great beauty, they can compare with the best metal-work of the Middle Ages, when one of the greatest sculptors was willing to pass a long life in work upon a pair of doors.

M. Coquart, who a few years ago decorated the interior court of the *Ecole des Beaux-Arts*, was not content with careful studies on a large scale, but for a long time studied their effect when hung upon the walls themselves, in vast sheets of paper. Until we realize in America, that the best art must cost dear in time and money, the highest art cannot flourish among us; but our chief fault is impatience at delays which must occur in the studies of conscientious artists, rather than want of liberality in expense.

R.

THE LATE BUILDING ACCIDENT AT ST. JOHN, N.B.

NEW YORK, Dec. 27, 1877.

TO THE EDITOR OF THE AMERICAN ARCHITECT AND BUILDING NEWS.

Dear Sir,—We have just read the letter of your St. John, N.B., correspondent, and we cannot allow his statements to pass current either with the public or our professional brethren. We send you an account of the accident, and hope that you will correct in your next issue your correspondent's statements.

The buildings on King Street, St. John, N.B., referred to in "Warrington's" letter, were one for Messrs. A. and J. Hay, which had a frontage of 24′ 3″, with party-wall of brick 12″ thick; and adjoining it was one for Judge Skinner, with a frontage 16′ 3″. The Hay building was built first, and had a 12″ wall butting against a 12″ wall on the other side from Judge Skinner's. The Hay building was divided into two stores, with a 3′ stairway in the centre leading from the front; the stud partition running all the way up, and so dividing it into two buildings. Our arrangement with the Messrs. Hay was to supply plans and specifications, and to superintend only the mason, iron, stone, and granite work, as they had a carpenter in whom they placed complete confidence. The object of this was to reduce our charge for superintendence. It was the first case of partial superintendence we ever had, and the sequel showed its injudiciousness. The senior member of our firm was residing in St. John at the time. He has had twenty-seven years experience as an architect, and this is the first case of a building falling down with which he was in any way connected. As it was, he detected the studs buckling the evening before the accident occurred, and notified the owner and carpenter, who said they would attend to it next day; but it did not wait until next day, and therefore the accident. The case has been investigated, and settled by arbitration, and the following facts have been obtained, which throw the blame where it belonged; i. e., on the carpenter for neglecting to follow the specifications, and on Messrs. Hay for false economy. The specifications called for 3″ x 4″ studs, but the carpenter put in 2″ x 3″ studs, and these he set flatways. The beams called for were 3″ x 9″, and these he put in in two lengths, contrary to our instructions, but the owners sustained him in this false economy of material. Now these beams, nine-tenths of which were in two lengths of 12 feet each, all rested on the stud partition in the centre. The rough floor was laid, and the roof only sheathed in; the rain soaked the floors, making the weight too great for the small 2″ x 3″ studs, which buckled and let down the floor-timbers in the centre, and so thrust out the party-wall between the Hay and Skinner buildings. The beams on Skinner's side, having been put in after this party-wall was run up, were of course no support to the party-wall from that side. All of these facts were fully demonstrated at the arbitration examination, and the blame settled on the carpenter alone, as he had the entire and sole control of his work; and the expense of rebuilding is put upon the owner and his carpenter.

We solicit your careful perusal of these facts, and trust you will speedily correct the false impression caused by your correspondent's statements.

Very respectfully yours, WEST AND ANDERSON.

THE AMERICAN INSTITUTE OF ARCHITECTS.

BOARD OF TRUSTEES.

REGULAR monthly meeting Nov. 1, 1877.

The Treasurer called for exact information as to the resolution passed at the late convention, in relation to the formation and duties of a special Committee on Ways and Means. The Secretary read the resolution.

Attention was directed to the fact that the resolution called for said committee to be appointed by the chair, and "to consist of three members, one of whom shall be a member of the Board of Trustees."

The Secretary said that it seemed to him there would be danger of cross-purposes between the Committee on Ways and Means and the Board of Trustees if the Treasurer were not a member of both, and moved that the Board records its opinion that the Treasurer should be a member of the Committee on Ways and Means, and so inform the President. Carried.

The Secretary presented several resolutions passed at the late convention, and referred to the Board of Trustees as follows:—

In relation to Honorary Membership. It was ordered that the resolutions be placed in the minutes.

In relation to testing so-called fire-proof material. The Secretary was requested to ask the President for information as to the proper authorities.

In relation to Committees of Examination. The Secretary was instructed to communicate the preambles and resolution to the Chapters that do not yet include a Committee of Examination in their organization, and request them to act on the recommendation of the Convention. The Secretary asked for authority to let authors of documents have them back for verbal revision. The Secretary was authorized to send copies thereof, but not the originals.

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Regular quarterly meeting Dec. 6, 1877.

On motion of the Treasurer it was resolved that the Secretary communicate with the Chairman of the Committee on Ways and Means, and inquire what progress has been made toward ascertaining the will of the Chapters in regard to the proposed change in the annual dues, and to call attention to the fact that until a decision by the Chapters is reached in favor of the proposed system of payments, the present system is in force, and will rule in the payments shortly to be demanded.

The Secretary called up the cases of several candidates.

Mr. Upjohn moved that the Board take up the question of Honorary Members who are deriving emolument from the practice of architecture. The Secretary deprecated hasty action on a subject so delicate, and read from the minutes of the Board for Oct. 4, 1877, the resolution of Mr. Upjohn's which had been incorporated into the annual report of the Board, and on which the action of the Convention had been based. The Treasurer also spoke in favor of a calm consideration of the matter, and Mr. Upjohn withdrew his motion.

The Secretary read a letter from Mr. A. J. Bicknell, under date of Oct. 22, 1877, and his answer thereto under date of Nov. 2, 1877, in reference to the exchange and sale of formula for building contracts issued by the Institute, and Mr. Bicknell. The Secretary's letter was accepted as the answer of the Board of Trustees, and the matter was laid on the table.

The Secretary read a letter from Mr. P. B. Wight, under date of Nov. 11, 1877, offering suggestions as to practicable methods for carrying out the resolution of the late Convention in relation to the testing of fire-proof materials and methods.

The Secretary was requested to request Mr. Wight to follow up the subject, and to ask Hon. Abram S. Hewitt to interest himself in it.

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NOTES AND CLIPPINGS.

THE WASHINGTON MONUMENT.—Professor Henry and other directors of the Washington National Monument will ask from Congress, after the recess, authority to use a portion of the $200,000 appropriated last year, in giving greater stability to the foundation if desirable. They still propose to carry up the monument to a height of 485 feet, in accordance with the plan approved by Congress.

ACCIDENT.—As the workmen were finishing one of the brick arches which aid in supporting the approach to the East River Bridge, on York Street, near Fulton Street, Brooklyn, on Saturday, Dec. 22, it fell. All the laborers had sufficient warning to escape, except Neil Mullen, who was buried under ten tons of brick, and instantly killed.

The Obelisk for New York. — A private letter from Egypt, which has found its way into the New York *Times*, suggests that our congratulations over the prospect of an Alexandrian obelisk in America have been rather premature. No one in the Egyptian capital has heard that the Khedive has made any such gift to this country, though those who have daily access to his Highness would be as apt to learn the news as an English engineer. It seems quite likely that the one hundred thousand dollars required to bring the obelisk to New York will not have to be forthcoming yet awhile.

The White Incrustation on Bricks. — At a meeting of the Philadelphia County Medical Society, held Dec. 26, this subject was reported upon by the Committee on Microscopy, Dr. Jos. G. Richardson, chairman. The committee decided the white deposit to be sulphate of magnesia, better known as Epsom salts. In the deposit, the microscope revealed the presence of epithelial scales from the human skin, and the *débris* of many plants. The sulphuric acid comes from the coal-gas and the coal burned in the city; the lime, or magnesia, is from the bricks themselves, a large quantity being found in the clay of which they are made. It is not regarded as in any way injurious, though quite unsightly and destructive to the walls. This coating may be prevented by a thick coat of paint on the wall, or the immersion of the bricks before use in a bath of sulphuric acid, and subsequently to the action of running water.

The National Museum. — It is to be hoped that Congress will shortly appropriate the necessary money for building a National Museum, which shall receive as the nucleus of its collections the articles presented to the Government by the exhibitors in the late Centennial Exhibition, both private and public. These articles, which are worth more than a million dollars, are at present stored in their boxes at the Smithsonian Institute at Washington, and are presumably in danger of deterioration through neglect.

Relics of the Lacustrine Villages. — A collection of relics from the lacustrine villages of Switzerland has been secured for exhibition by the Pennsylvania Museum and School of Industrial Art at Philadelphia. Professor Ferdinand Keller made the collection, which consists of charred fragments of woven fabrics, bone implements, needles, scrapers, chisels, awls, and circular perforated disks for weaving, charred fruit, nuts, and grain, bronze implements, spears, knives, razors, sickles, armlets, needles, etc., stone axe-heads set in deer-horn, fragments of pottery widely ornamented, and numerous unshaped pieces of horn and bone. The specimens are from various localities in the lake region of Switzerland; some from the remarkable village of Robenhausen, near Lake Pfaffikin, in the canton of Zurich, and others from the dwellings of a later period in Lake Neufchatel.

What a Paternal Government sometimes does. — Some years ago the Wurtemberg Government erected a number of dwellings for the men employed in its iron-works, and lately has built quite a little town at Stuttgart for the benefit of its employees in the railroad and post-office departments. What led to their erection was the very rapid increase in the rentals and cost of living. The Government leases these buildings, which are admirably designed for comfort and economy, to its employees, who pay a moderate rent. This course was probably found to be much more economical than raising their salaries. In connection with the dwellings are a public kitchen and large baths and wash-houses, and every possible sanitary precaution has been taken.

A Monument to Liebig. — The city of Munich has instituted a competition for a design for a monument to Liebig, and will grant a first prize of the value of $400, and a second prize of the value of $300. Models of the monument must not exceed three feet in height, including the pedestal. These models will be transported to Munich free of expense to the competitors. The competition is closed on the fifteenth day of June next.

Using the Roman Coliseum. — We rather wonder that the idea that has occurred to Mr. Scott Russell, the builder of the Crystal Palace at Sydenham, has never struck anybody else. He proposes to provide Rome with a place for holding an international exhibition which would of itself form one of the chiefest attractions of such a fair. He offers to change the Coliseum into a covered building suitable to exhibition purposes at the comparatively small expense of stretching a velarium over it. Imagine the *coup d'œil* from the topmost range of seats!

The Italians at the Coming Exhibition. — It is said that the French architects are much surprised at and pleased by the beauty of the façade which the Italians are building for their compartment in the great exhibition building.

The Walls of Rome. — The removal of the mound of earth and *débris* to the east of the railway station on the Esquiline at Rome has brought to light a fine fragment of the city wall in the time of the Kings. It is to be hoped that some steps will be taken to preserve it, together with the remains of handsome houses, probably of the time of Augustus, which were found built against it. The wall is here over thirty feet high.

The Beggars' Bridge at Florence. — There is a legend in Florence that a Grand Duke once proclaimed that every beggar who would appear in the grand plaza at a certain time should be given a new suit of clothes. The beggars of the city were on hand promptly, when all avenues to the plaza were closed, and each beggar was compelled to strip off his old clothes before receiving the new suit. In the old clothes thus collected, enough money was found secreted to build a bridge over the Arno, which is still called the Beggars' Bridge.

An Old Italian Buried Town. — An interesting archæological discovery has just been made in Italy, — that of a buried town, a new Pompeii, unexpectedly found near Manfredonia, at the foot of Mount Gargano. A temple of Diana was first brought to light; and then a portico about twenty meters in length, with columns without capitals; and finally a necropolis, covering 15,000 square meters (about 3¾ acres). A large number of inscriptions have been collected, and some of them have been sent to the museum at Naples. The town discovered is the ancient Sipontum, of which Strabo, Polybius, and Livy speak, and which was buried by an earthquake. The houses are twenty feet below the surface of the soil. The Italian Government has taken measures to continue the excavations on a large scale. Every day, some fresh object of interest turns up. The latest is a monument erected in honor of Pompey, after his victory over the pirates, and a large quantity of coins in gold and copper.

Hot-Water in the City of Pesth. — The city of Pesth has almost accomplished the task of obtaining an unlimited supply of nearly boiling water, which will be available for public and private use. The ready heated fluid is obtained from a deep artesian well, from which when completed the water will issue in a mighty fountain, to the height of nearly fifty feet. The deepest artesian well in the world has hitherto been that at Paris, which measures 1,794 feet in depth. The Pesth well has already attained a depth of 6,120 feet, and will, when bored the required depth, more than double the depth of its Paris rival. The water now issuing from the bowels of the earth, three-fifths of a mile below the surface, has a temperature of 161° Fahrenheit, and the work will be prosecuted until a warmth of 179° Fahrenheit is obtained. The meaning of these figures will be better understood when it is remembered that the temperature of a hot bath is 98°, while that of boiling water is 212°. The daily supply is already 175,000 gallons, — a quantity which will be greatly increased at the enhanced depth. The work progresses at the rate of 50 feet a month, and recent improvements in the mechanical appliances render possible a still more rapid rate of working. This remarkable undertaking is being carried on partly at the expense of the city, and partly at the expense of the engineers, Messrs. Zsigmondy. — *Building News.*

Ultramontanism. — At a recent meeting of the Buda-Pesth Society of Architects and Engineers it was discussed "whether architects of other than Roman Catholic religious belief are able to give professional judgment on the plans of Catholic churches." Strange as may seem the proposition of such a question to a scientific body, the decision that they are not is yet more astonishing. The case which gave rise to the discussion was as follows: The architectural section of the Society was requested to give a technical opinion on plans submitted for the new church of Telegyhaza. For this purpose jurors were chosen by ballot. It so happened that because of their professional ability, a Protestant and a Jew were elected. Hereupon there was a great outcry from the ultramontanes, which resulted in the resignation of the gentlemen chosen, and the speedy substitution of good Roman Catholics in their place.

Geological Footprints. — It is not generally known that the glen at Bellona, Yates County, contains a remarkable curiosity. In the bed of the stream, just above the village of Bellona, is a rock about fifty feet square, uncovered at low water. It is entirely covered with footprints, deep in the rock, of men, and birds, and extinct animals. They are are clearly defined as the footprints of the children who had played on the damp bank the morning I visited the glen. Some of these human footprints are very small and delicate; others are large — shockingly large — yet retain their symmetry. The distinctness of these tracks and their relative position preclude any doubt of their character, even to an unscientific observer. I found tracks of some animal in this rock which measure thirty inches in length; I mean distinctive tracks, several times repeated, with such exactness of outline as to identify the species to which the animal belonged. These rocks are a favorite resort of geologists from all parts of the country. The layer of limestone upon the surface of which these footprints appear is about two feet in thickness. Some of the finest specimens have been destroyed by removal of parts of the rock for building purposes — a fate which awaits the remainder. I shall endeavor to procure casts of several of those remaining. It is stated by reliable witnesses that many years ago, while workmen were blasting these rocks to obtain building stone, a perfect petrification of a human head and face of an unknown type was found. The workmen and many others crowded around to examine it, and one of them, impatient at the work being stopped, struck it with his hammer and destroyed it. — *Letter to the Rochester Democrat.*

Hydraulic Cement. — An excellent cement for foot-walks, and for all uses which require exposure to the weather or to dampness, is described in *Der Practische Maschinen-Constructeur*. It is made by thoroughly stirring Portland cement, or good hydraulic lime, into a warm solution of glue, so as to make a thick paste, and applying it immediately. In three days it acquires extraordinary hardness and tenacity. It is an excellent cement for joining the porcelain heads to the metal spikes which are used as ornamental nails.

Cleaning Polished Floors. — An oak floor needs only to be rubbed about once a month, with a well-oiled cloth, it in the interim is rubbed daily with a dry one; but for polished wood that has been neglected, rub in plain linseed oil, and let it dry; and then apply the following on a flannel cloth: shave ¼ lb. of beeswax into an earthenware jar, pour in enough turpentine to cover the wax, and place near the fire till the substance is quite dissolved.

Prizes. — The attention of our readers is directed to the publishers' announcement regarding subscription prizes, which will be seen on the opposite page.

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A CASE of some importance touching the construction of buildings has lately been decided in Philadelphia, as we learn from the *Real Estate Reporter*. In last February an Act of Assembly was passed, ordering that the building of all schoolhouses for which appropriations should be made by the city of Philadelphia should be under the direction of the Board of Public Education of the city, who were to provide proper plans and specifications, and advertise for proposals for the work. In May the City Councils passed an ordinance that no permits should be issued by the Building Inspectors for the erection of places of worship, hotels, public halls, theatres, or schools, unless plans were submitted to the Inspectors, and the modes of ingress and egress shown were approved by them. The Board of Inspectors then passed the wise resolution that the stairways of all public schoolhouses should be built of non-inflammable materials, and enclosed in stone or brick walls. Soon after, the Board applied to Court for an injunction upon the contractor for a new schoolhouse, alleging that he had submitted plans and applied for a permit; that they had found the means of egress insufficient, and staircases dangerous, and had refused to give a permit for the building, notwithstanding which the contractor had persisted in carrying it on without modifying the plans. They then prayed that he should be ordered to construct the stairs and entrances in such ways as they should approve, and be enjoined from continuing as he had begun. The builder's answer was that he had contracted with the city to build a schoolhouse according to the plans and specifications of the architect of the Board of Public Education, and to finish it by a specified day under penalty of ten dollars forfeiture for every day's delay, and had given bonds to the city for the performance of his contract; that he was acting under the authority of the Board of Public Education, in whom, he was advised, the entire control of the building was vested by the Act of Assembly, subject to no authority of the Board of Inspectors.

THE Court, at a preliminary hearing, granted a temporary injunction restraining the builder from putting up his stairway, according to the first plan, and ordering him to submit a plan that should be approved by the Inspectors. Now, after a full hearing, it has decided in favor of the Inspectors, declares its first order "peremptory, mandatory, and final," and continues the injunction. The real quarrel is, of course, between the two Boards, the contractor being only the scapegoat; and since one claims its powers by virtue of a city ordinance, and the other of an Act of Assembly, we are led to suppose that it is a phase of the continued quarrel between the authorities of the State and City, of which the muddle over the Public Buildings is the chief event. The legal question involved is local, and not a subject for lay criticism; but it is a matter of general interest and of great importance in the interest of a good system of building, that wherever building laws exist, no one should have the power to override them. There is no part of such a system that is more important than proper restrictions on the stairways and exits of public buildings and schools. The rule laid down by the Board of Inspectors is one that ought to be enforced in every city; and to have it contumaciously set aside by the authorities anywhere in the first conspicuous attempt to enforce it would be a serious blow at an important reform. If there is likelihood of conflict of authority in such matters, it would seem to suggest to other States the desirability of providing for safety by the interposition of the higher authority, and the enactment of building laws by State Legislatures, of which Ohio has already set an example, and of which there has been some discussion in other States.

GOV. HARTRANFT'S message to the Pennsylvania Legislature last week contained a great many sound and sensible remarks on the condition and present tendencies of workingmen. His position as governor of the chief industrial State in the Union makes it natural for him to recognize and declare the paramount importance of the labor question in our day. He steers dispassionately between favor for capitalists or for working-men, and sets forth in a few clear words the errors and mischiefs of the present policy of labor agitations and trades-unions. We have not space to do justice here to what he says on this subject, but may have occasion to return to it hereafter. A large portion of the message is naturally given to an account of the riot of last summer, for which he fairly and very moderately sets forth the responsibility of the strikers thus:—

"While it is true that the working-men, who began it, contemplated no such terrible results, it cannot be denied that the manner in which they proceeded to enforce their demands, by stopping inland commerce and seizing the property of corporations and individuals, and driving citizens from their usual occupations, in defiance of law, made the breach through which the lawless elements of society poured to plunder and destroy. By thus inconsiderately inviting the co-operation of the criminal classes, labor did itself a great and grievous injury; and it will be long before it can remove the suspicion and distrust with which the people will view its strikes and organizations."

IT is only three or four years since London finished her very expensive system of sewers. By them she delivered that part of the Thames which lies within her territory from the pestilential condition to which her old system of direct drainage had brought it, and supposed she had permanently relieved herself from embarrassment. Huge sewers were built on the north bank, and, intercepting the sewage, carried it some miles down the river, delivering it at Barking Creek, below the docks and Woolwich, where it was thought that it would be beyond making trouble at the reflux of the tide. But the Conservators of the Thames have already found reason to be alarmed at accumulations in the river-bed, and have lately been studying the actual operation of the sewers. It appears that the sewage is by no means carried by the ebb-tide beyond the danger of returning. Capt. Calvert, who has made the observations, reports that there is in the river a permanent body of polluted water "eight miles long, seven hundred and fifty yards wide, and four and a half feet deep," which he calls a sewage-section; and which, "charged with offensive matter, both fluid and solid, moves up and down the channel four times daily between Gravesend and Blackwall," and deposits its suspended matter wherever slack water favors it. By this deposit, it was found, the channel of the river had lost a quarter of its capacity at low water opposite the southern outfall; the creeks near it are said to be filling up, and banks are forming in the river as far up as Battersea, on the western edge of the city, and miles above the point where the sewage is delivered. The evidence of the senses was enough to show that the deposits were of matter from the sewers, without the careful analysis by which this was proved. The rapidity with which they have formed gives reason for serious fear that the present sewerage of London is spoiling the river-bed.

THESE deposits indicate that the concentration of all the wash of a great city at one point of delivery makes a burden

that the current of an ordinary tidal river like the Thames cannot carry away. On the other hand, the distributed delivery of it had for many years before grown to be intolerable, and it looks as if all the difficulty of the problem were to return upon the Londoners. The Boston papers have been led by this experience to talk more anxiously about the new plan of sewerage which has been adopted for their city. In this case, however, the great object is to keep the sewage out of the small tidal rivers that flow into Boston Harbor; and much money is to be spent in carrying it by a tunnel to an island, where it may be delivered well out in the harbor into a free tideway, and by being discharged on the ebb will, it is hoped, be carried out of harm's way. The probability of success depends here upon the accuracy of the experiments that have been made on the flow of the tide, and the security of the deductions from them; the trustworthiness of which we presume there is no reason to doubt. Unfortunately it is inevitable to regard any system of city sewerage that may be proposed as in some degree tentative, for the whole question is a new one. What people call sanitary science is but in its infancy, and all its methods are still experimental. Yet its problems must be solved, and can only be solved by experiments. Costly as these may be, and are, there is no substitute for them: the only choice is of those which promise best, and at least cost in proportion to the results they promise. Mr. Mansfield, F.R.S., of Glasgow, is cited as saying that engineers would be driven to excluding from the sewers every thing but the street-sweepings. These, however, are just the accumulations of which it is possible to get rid without using the sewers; and also the part of sewage which from containing most inorganic dust makes the heaviest deposit. A point to be remembered is that when sewage is discharged into a current or basin that dilutes it till it ceases to be poisonous to the animal and vegetable scavengers that inhabit water, it is rapidly taken up by them. Every piece of water that is not stagnant can in this way dispose of a certain amount of refuse-matter. One of the questions to be determined in the system of water-carriage is, how great an access of water is necessary to produce this result. If it proves that for a large city nothing less than an outfall into the Gulf Stream will suffice, we shall be driven in most cases to abandon water-carriage, or at least to follow the example of Paris in excluding from sewers the most mischievous part of city refuse, and to find some other way of disposing of it.

Some interest and feeling have been excited among a number of French architects by a competition for a town hall at Evreux, under circumstances somewhat peculiar. The brothers Dethomme had bequeathed to the town 375,000 francs (875,000) to build a town-hall; and the municipality, we are told by *La Semaine des Constructeurs*, advertised last spring for designs in competition, publishing a list of requirements, one of which was that the estimated cost of the building should not exceed the sum bequeathed. Three prizes were offered, — a gold medal and the execution of the work, and two premiums of 2,400 and 1,200 francs. The municipal commission were wise enough to call in professional advisers, and invited MM. Viollet-le-Duc, Trelat, and Bourdais to examine the designs, and award the prizes. When the three experts had made their selection, a member of the commission interposed the objection that no one of the premiated designs could be carried out for the stipulated sum. The experts in their report referred to this question, and gave their opinion that it was impossible to satisfy the requirements of the programme for that sum, saying that these requirements exacted at least nine hundred superficial metres of building, and that such a structure as was called for could not be built for less than 600 francs the metre, which would raise the cost to 540,000 francs. They, however, awarded the prizes to three designs, each of which exceeded the area they named. Upon this the *maire*, accepting this statement of the necessary cost, declared the competition null, and the prizes not awarded, on account of the impossibility of the problem. The experts nevertheless declared, while adhering to their position that the limit set was an impracticable one, that the plans having been accompanied by estimates which fulfilled the condition of being below the limit, it was not equitable, and therefore not possible, to refuse to award the prizes to them; and the commission, after deliberation, accepting the report of the experts, awarded the prizes accordingly.

Then followed a variety of recriminations from disappointed competitors, and accusations that premiums had been given to designs whose estimates were 165,000 francs beyond the cost appointed, without regard to the fact that this excess was simply the guess of the experts. *La Semaine* in commenting upon the matter, reminds the competitors that there is no evidence that the cost of the accepted design would pass the limit, and that the guess of the experts is not lightly to be preferred to the carefully prepared estimates received with the projets; and then goes on to read a lecture to MM. Viollet-le-Duc, Trelat, and Bourdais, for exceeding the limit of their duties. Which way the matter will finally turn, does not appear. The principle of expert adjudication upon architectural competitions is one so important to uphold that we can only regret every embarrassment that seems to threaten it with disparagement.

We notice in the English building-journals an advertisement by the Irish Institute, of prizes to students for an essay on the objects of architectural interest in or near Dublin. This is the carrying out of a policy of the English professional associations which has borne good fruit, and reminds us of the judicious suggestions of Mr. McKim at a late meeting of the New York Chapter of the American Institute, reported by our New York correspondent in our number of the 20th ult., which were followed by the appointment of an Antiquarian Committee. The careful study of old work which is necessary in making drawings of it is one of the best possible means of discipline for students. It is an essential part, wherever it is practicable, of every course of instruction in architecture. One of the duties of the prize students from the *École des Beaux-Arts*, who are maintained in the French Academy at Rome and on their travels, is to send home thorough studies and restorations of ancient buildings. The system is good in another way, for it is a means by which students may increase the world's store of historical information from which they draw. Much valuable work has been done by the French by this means, and by the English students encouraged through the prizes of the English Institute and Association. Our fellow journal, the *Building News*, has done excellent service in this way. Hitherto there has not been much done for American architecture, partly because there has not been till lately any regular instruction or any stimulus for students here; partly because no one has thought old American buildings worth notice. This is to be regretted, for though there is no great work, or very old work, to look back to, there is a good deal that is interesting enough to be worth making a record of. Now that the English have drawn attention to the work of the mother country in our colonial times, there is a new interest in our own, which is going so fast nowadays, that it is worth while to put it on record as promptly as may be. We shall be glad to publish any well-executed drawings of interesting work of the kind which are sent to us. This study, however, is emphatically of the kind which is justified only by being well done. The value of such drawings depends on the faithfulness, precision, and understanding with which they are made. There is a kind of refinement in the best of the Continental work, which altogether eludes a careless or unsympathetic representation, but which is an admirable corrective for the slashing and rather coarse kind of work to which Americans have tended of late years.

THE CHURCH ARCHITECTURE THAT WE NEED.

[A paper read at the Fourth Church Congress held at New York, Oct. 31, 1877, by Rollen T. Lidell, F.A.I.A.]

A church is indeed the temple of God; but it is not for Him alone that it should be built. The temple is the place where the *people* assemble to be in His presence; and hence it follows that proper provision must be made for such assembly, that all things may be done decently and in order. The architecture of a church, then, must take special note, *first*, of the *rites* to be performed therein; *second*, of the proper accommodation of the people who come to witness and to join in the ceremonies.

In considering the kind of church architecture that we need, it is necessary to start from the ground that underlies all architecture; namely, that we must build upon the works of those who

have gone before us. It is in art as in speech, a language has grown up through invention, accretion, modification, which meets the wants of the people who use it, furnishing a medium of communication flexible to all requirements, whether of the homely needs of every-day intercourse, or the highest flights of oratory, poetry, or science. This great scope and pliability cannot be the work of any one mind, or any one combination of minds: it is the outgrowth of generations. And so we must dismiss once and forever the idea that we need a *new* architecture; and leaving out all attempts to create a new style, letting originality take care of itself, we should endeavor so to use the styles which form a traditional architectural language as to expand them into new forms and modifications which shall express our progress and light. We must progress in art-work; there is no such thing as standing still; and if we do not bring to bear upon church architecture all the light which experience and intellect can give, we shall inevitably retrograde through mannerism into imbecility. The cause of art decay is as evident as the result. It needs little skill to discern the reason why the pure French Gothic declined into the Flamboyant, or why the English Gothic degenerated into the Perpendicular,—it was the substitution of formula and copyism for brain-work.

It is hardly to be presumed, that in the selection of the true style to form a basis for our future church architecture, many will seriously maintain that we have a choice other than the English Gothic. It is the work of the English Church and the English nation; and we, as successors to both, would scarcely be wise to seek another, even if better were to be found: new departures are perilous. But it has claims upon us other than these: it is rich and simple, strong and flexible, adapted equally to the cathedral, the parish church, the castle, the cottage, in its own country, and it easily and naturally moulds itself to any climatic requirements. Given, then, the English Gothic as our general style, we should seek to discover at what time it had fully developed its characteristics, while preserving its purity; and this we find to have been the early part of the fourteenth century, a period generally known as that of the "early geometrical" or "decorated." We can do no better than to work from this standard, allowing occasional wanderings into the period of "Early English," and, when a round-arched style is necessary, into a modification of the later "Norman" or "Romanesque." Moreover, it would be well not to confine our study to the examples on English soil, but to extend it to the architecture of the North of France, a very important and well-developed branch of the same style. And our style thus adopted should not be merely followed; it should be embraced, assimilated, made in all things a part of ourselves. There should be brain and heart visible in all its workings; there should be no slavish submission to precedent, merely because it is precedent, but the spirit of the mediæval times should be the guide rather than the letter. The men of those days built in the true spirit; trained fully in the works of those who had gone before them, they allowed those works to give direction to their own, while hungrily availing themselves of all improvements which science offered or study educed, and of the examples of their contemporaries in their own or foreign lands.

We must do the same: it would be folly to tie ourselves down to mere imitation, to refuse the innumerable advantages given to us and denied to them. Such refusal would cause our churches to be mainly lifeless reproductions in place of living architecture, mediævalism in place of art; and although mediæval work *was* admirable, and *is* admirable, yet for modern days it is not to be desired, except in those cases where the needs of the two ages, the past and the present, run closely parallel or exactly coincide. We must exercise, then, the broadest, the wisest, the most conservative eclecticism. Our architecture must above all things be truthful. Every thing that is used therein must be exactly what it seems to be, and nothing else. Plaster when used must not imitate stone. Cheap lumber must not masquerade as precious wood. Veneers and shams of all kinds must be contemptuously discarded. And this principle of veracity must apply not only to material but to methods, whether of construction or design. The science of architectural engineering, for example, has developed a character of general construction very different from that with which our predecessors were acquainted; and this added knowledge should be shown in our work, or it will be fairly liable to the imputation of untruthfulness. The same remark will apply as well to joinery, locksmithing, and the majority of the minor arts; the simulation of ignorance and rudeness therein is an evident deceit. Our architecture must be comfortable; the uneasiness of the body necessarily distracts the mind from worship, and every ancient or modern appliance which provides fresh air, full light, gentle heat, *et cetera*, should be faithfully used to the end that the congregation shall not undergo unwilling penance. Then, as a natural sequence of true comfort, our churches will be healthful, and hereafter darkness, dampness, and foul air will not depress the vital powers and sow the seeds of disease. Our architecture must be symbolical. Why should great masses of masonry, timber, and iron be heaped together and made complete for the body, if the mind is not provided for? To rear a pile which shall not speak to the intellect and soul from every nook and corner, would be as if we were to make a pulpit where there was no preacher. True symbols will fill the soul with devotional thought, even when by chance the pulpit sermon only "preacheth patience." And in the young the object-teaching given by them will remain firmly fixed, when spoken words might have been too deep for their understanding. In the application of our principles to the production of such church architecture as we need we are painfully conscious that owing to the constant changes of the population of the country, and to the small means generally available, churches are in most cases provisional in their character, few being likely to remain for more than three or four generations at the longest. It is during this provisional period, however, that the transition is to be made from Anglican church architecture to American church architecture; and our processes if not correct during this time will lead us to a lamentable result.

The plan, the ground plan, of a church, should in a great measure control the exterior; or rather they should be thought out together, with mutual dependence, so that from the exterior the plan can be approximately understood. In the making of the plan the rule of orientation, as an expedient of art, deserves more consideration than it generally obtains; more especially in the building of city churches, for it compels them to a greater individuality by preventing the adoption of the simplest method of enclosing a rectangular space, and gives an infinite scope to variety in grouping, the more desirable where all buildings around tend towards showing mere façades. And the building should declare its nature at first sight, not only showing that it is intended for a place of worship, it should distinctly impress upon the minds of beholders that it is a *church*, belonging to the lineage of the Anglican Church, and could by no possibility have been designed for any other use. And by its solemnity, beauty, and grandeur it should urge upon the merest passer-by the importance and mystery of the great ceremonies performed within its walls; and it should invite the stranger to enter, to worship, and to feel that it is a home. And it should be a landmark, so set and built that even in the midst of a crowded city it cannot be passed by unwittingly. In the city or undulating country, the lofty spires should mark its location, breaking the sky-line with their sharp, cross-surmounted peaks. In level meadow-land, or on abrupt bluffs, the massive towers should suggest the thought of a refuge and a stronghold.

There seems to be small reason to doubt that in the architecture of future churches the chancel will hold, and develop more greatly than in years just past, its rightful superiority. It is evident that being the visual focus of all assembled in the building, it should have proportions sufficient to redeem it from any appearance of meanness. Being the place where numerous offices are performed, it should have more than enough space for the proper conduct of them all, that crowding or confusion therein should be an impossible event. Breadth and height all will agree to give to it; and if for no other reason than ease to the eyes of the congregation, and artistic effect, it should have ample depth. Its space should then be properly apportioned, giving in a chancel of ordinary depth, one-third to the sanctuary, and two-thirds to the choir. The organ should be placed in a choir transept or chapel, opening widely where practicable both into nave and chancel. The font belongs by right to an entrance porch or baptistery, preferably to one near the chancel and opening into it as well as to the nave. With regard to the conflicting claims of the square end and apse as chancel terminations, the Anglican traditions point to the former; but perhaps it would be better to allow the use of both on equal footing, making only this distinction, that the square end is preferable when the depth of the chancel is limited, the apse when the depth is great. Except in small churches the most effective series of elevations for the different parts of the chancel is, three steps from nave to choir, one or more from choir to sanctuary, but generally three, and three steps from the floor of the sanctuary to the foot-pace of the altar. The chancel, being the head of the church, should be its crown, its glory, and should be so recognized within and without. Whatever of treasure, or thought, or art, there may be, here is the place where it must first be disposed; let the rest of the building go bare, but make the chancel rich. And make it so in gradation: let the sanctuary be richer than the choir, the reredos the richest part of the sanctuary, and above all other things let the altar predominate, the most glorious point of all the edifice, of the most precious material, most carefully worked.

The most obvious plan for the body of the church is the simple nave; this has the advantage of economy when the span is moderate, and also that of an unobstructed passage for sight and sound. On the other hand it is difficult, especially in a large nave, to avoid monotony of effect; and further, the congregation collected in a mass has very much the appearance of a crowd, and individuality is in a measure lost. There is a natural instinct to adhere to the traditional plan handed down from the basilica of Rome, through all changes of architecture, to the present time. And in truth it is difficult to find one nearly so beautiful in its subdivision of nave, aisles, and clere-story supported by arcades, making constantly changing effects of light and shade and color. The objections urged against this plan are very strong in the minds of some, especially among the laity, who feel that the interference of the supports with sight and hearing is a very serious one, and renders worship difficult. In a measure this interference can be

avoided by using for the shafts of the interposing columns either granite or iron, whose great strength allows a reduction of the thickness of the pillars to a few inches, so that a slight motion removes the eye from behind the obstacle. Or again, it can be entirely avoided by relegating the aisles to their original use as ambulatories, and, in order not to waste room, diminishing their width almost to that of ordinary passages. This will also allow an overflow from the nave when a special occasion brings together a large congregation. Supposing either of these methods of relief to be adopted, there is no apparent reason why this plan should not remain a favorite one in the future as in the past, evenly dividing supremacy with the simple nave.

The cruciform plan has great beauty, but has also decided defects. Unless the transepts are of but very slight projection, or unless they are modified above the floor line into aisles or chapels, the sound will probably be unpleasantly confused and broken; and to fill with the voice a cruciform building of any size, will almost invariably require painful exertion to the speaker, and even then with an unsatisfactory result to his hearers.

No matter what system of planning may be the favored one, the treatment of the nave, as being the chief place of the gathering of the people, demands most careful consideration. A nave of two to two and a half diameters in length gives the best combined results as to capacity, convenience, and appearance; and the natural limit of the power of the human voice in public speaking gives ninety feet as a length beyond which it is not well to go, except in churches where a musical or semi-musical service is contemplated. Of course it is not to be supposed that galleries would, in any case be erected: they interfere with light, heat, ventilation, and hearing, they are unsightly, and they are unnecessary: as many persons can be accommodated upon one plane, within sound and sight of the chancel, as the most energetic priest with the amplest assistance would desire to have in his parish.

The acoustic qualities of the nave are favored when the apex of the roof is not too high above the floor, perhaps not more than one and a half diameters; when the pitch of the roof is not excessive, running from fifty to fifty-five degrees; when the walls are covered with rough-surfaced plaster; and when both roof and walls are frequently broken by panels, projections, or timbers. A wooden ceiling following the lines of the braces, collars, etc., of the principal framing, so as to form a semi-polygon, without concealing the important parts of the roof construction, is of great assistance to the quality of the sound, as well as to the comfort of the building. In a full open-timbered roof, which is of such exquisite beauty, care should be taken that the roof *skin*, as it may be called, should be double, enclosing an air-chamber of a few inches in thickness, sufficiently ventilated. Without this precaution, the heat of summer, the cold of winter, and the noise of heavy rain and wind, would be each intolerable.

But the details crowd in so rapidly upon us, if an entrance is once given to them, that we are debarred from their consideration; therefore it will suffice to say in general, that our desired church architecture must lay under tribute *all* the resources of art, painting, carving, sculpture, and polychromatic decoration, whether produced by pigments or in construction. All these are to be used constantly; they are aids to the purposes for which churches are built, which cannot be slighted without serious loss to the æsthetic qualities of the buildings, and to religion. And they must be used in pursuance of carefully-laid plans: the finest carvings, paintings, and mosaics should be placed nearest to the eye, so that their effect shall be fully gained, their stories plainly told. The farther the work recedes from the spectator, the more abstract and conventional it should become; but at no point should it ever be careless or unconsidered: the crockets climbing the side of the lofty spire deserve their fair proportion of study, as well as the capitals which greet us at the entrance to the porch. We are such a practical people, and so full of economy, that we are especially apt to slight æsthetics in our buildings; and churches suffer in common with the others from this national peculiarity. When, therefore, we undertake church building, we should, knowing this danger, take all precautions against it. The æsthetic qualities of a church do not depend upon its money value; a fair amount thereof are within the reach of the poorest mission chapel; and a glance at this or any other city will show that vast expense may be incurred without offering a single glimpse of religious or devotional art feeling.

It is beyond the power of any one to prophesy with reasonable hope of accuracy what shall be the final result of our attempts to elaborate a church architecture of our own, fitted to our needs now, and expanding with them hereafter. But starting with a pure style, reverently treated, not slavishly followed, with minds devoted to the study of church architecture as historically set before us, and as the mental and physical conditions of our country and our times demand, and with the principle always in view that churches are built for the glory of God as well as for the use of man, the church architecture that we need will come to us, of itself, in the very form which is the most to be desired; but it will come step by step, and not by a sudden inspiration.

A Costly Staircase. — The staircase of the Merchants' Exchange at St. Louis, Mo., is said to have cost $38,000.

COLONIAL HOUSES, AND THEIR USES TO ART.

What has distinguished the eclecticism of American architects from that of all others in the profession elsewhere is the fact that hitherto it has received no conscious influence from local antiquarianism. In choice of style we have been cosmopolitan. Our architecture has borrowed inspiration from all countries and ages but our own, and has for the most part contented itself with acclimating the revivals, the transitions, and the archæological enthusiasms of the older nations as they have occurred in the history of contemporary art. It so happens, however, that the new Georgian revival in England refers back to a period coincident with much of our own earlier colonial history, and we find that our brethren in England do not disdain to look even so far off as this country for authentic details of the revived art (see *Building News* of Sept. 21, 1877: "Sketches from Mount Vernon"). Thus at last we also are led to look for models of style nearer home, and to find certain æsthetic virtues in the colonial mansions. This movement introduces us into a new atmosphere, and supplies us with a new motive for architectural composition, a motive of patriotism, which, if we rightly improve it, may lead us to more distinctive local expressions in art, and relieve us from such unflattering imputations as those of our English contemporary, the *Architect*.

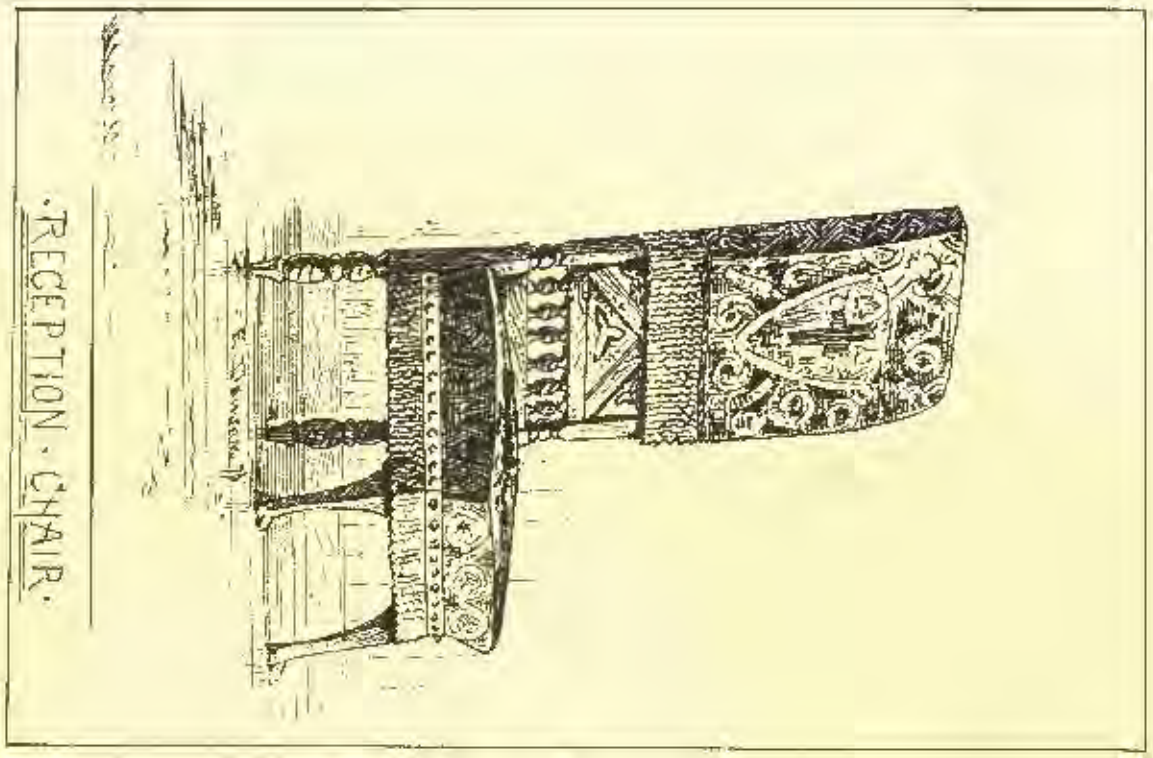
To the healthy development of this new style among us there is first needed knowledge of local precedent, such as we may hope to receive from the well-known antiquarian fervor of Mr. McKim, the new Secretary of the Institute, and such as Mr. Arthur Little has contributed in his "Early New England Interiors."[1]

This book contains thirty-eight sketches of interiors of the eighteenth century, from some of the older seaport towns of the New England colonies. Mr. Little modestly states in his brief preface, that they "are the results of a summer's work, undertaken for his own pleasure and instruction, and also with the desire to preserve the relics of a style fast disappearing; this disappearance owing partly to the perishable materials of the work, but chiefly to the national love of new things in preference to old." The subjects are well selected, and, though drawn with a heavy hand, not too well, and with a want of appreciation of the value of detail, which is to be regretted, preserve the essential features of the characteristic staircases, chimney-pieces, doorways, and corner buffets of our ancestors. Such examples are precious, not only for their associations and for their technical qualities, but because they are the genuine, unaffected, and unsophisticated productions of a certain phase of antiquity. Thus the parlor chimney-piece in the Devereux House, the doorway in the east parlor of the Nichols House, the Cabot House staircase, all in Salem, which perhaps are better preserved in Mr. Little's drawings than the other contents of his volume, are fair indications of a style so disciplined and ordered as to be capable of a certain degree of elegant expression, even in the hands of an uneducated carpenter. The chimney-piece, in especial, is full of the flavor of polite colonial life, restrained, fastidious, formal, and to our eyes quaint and somewhat pathetic in its unconscious innocence of the quips and cranks of modern art. The delicately panelled pilasters on the sides, with their precise strings of buds dropped from a correct bow-knot at the top, the frieze with its delicate conventional festoons and vases, and the lyre and leafage in the centre panel enclosed in a thin oval wreath of buds, the shelf with its fine subdivisions of mouldings, and its careful detail of dentils, — all these features enable us to realize the well-ordered households of the Madam Esmonds of the colony, and, combined, seem to give to history the very essence of the epoch.

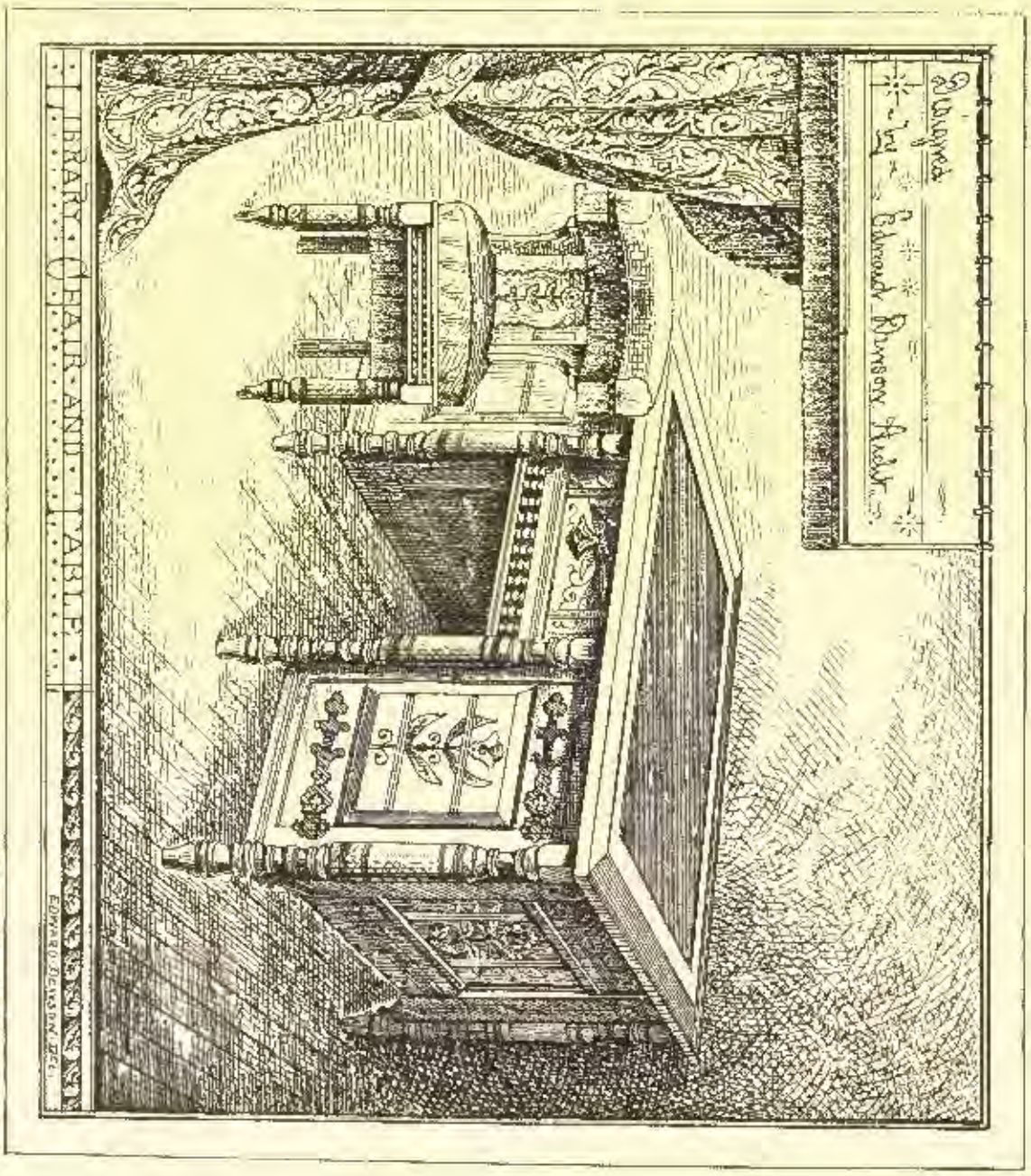
An architecture possessing such capacities of expression in its details, and standing but a little distance aside from the traffic and bustle of modern life, is worthy of a more careful setting forth than it gets in the work before us. If the studious measuring and careful drawing of such bits of antiquity as the panelling, the mouldings, the twisted balusters, three different patterns to a tread, the carved newel-posts, and the workmanlike string-pieces of the staircases in the Ladd and Langdon Mansions at Portsmouth, the Hooper House and Lee House at Marblehead, the Cabot House at Salem, — if the study of such honest details as these were made a necessary part of the education of our young architects, the architecture of the future would profit by it, and history would receive a new and notable illustration.

For these reasons, although applauding the idea and the intention of Mr. Little's volume, and although thankful to him for what he has done, we regret the absence of a more elegant and exact execution, and more especially of such measured profiles and details as are essential to the full understanding and realization of the subject. In fact, the details are the essence of the style; but to an uninstructed mind, they cannot be predicated from these sketches, to the proper interpretation of which the modern imagination is a perilous assistant. It seems to us that the pictures, as pictures appealing to the popular eye, would have lost none of their interest if the enlarged details had been properly set forth, as a margin perhaps upon each page; certainly not if the pictures had been treated more graphically, and if the old-fashioned accessories of furniture, old china, and bric-à-brac had been added to

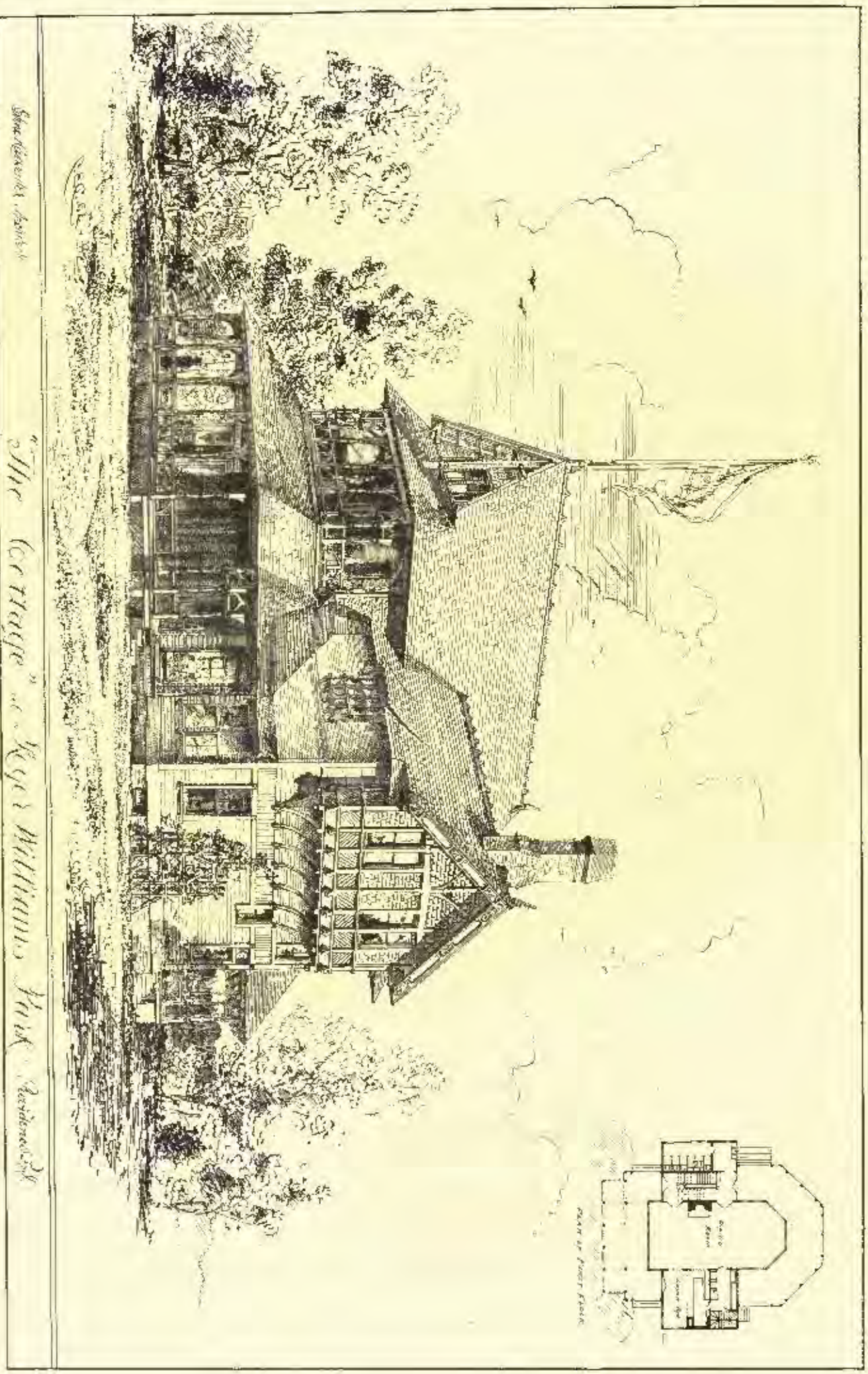
[1] Early New England Interiors: Sketches in Salem, Marblehead, Portsmouth, and Kittery. By Arthur Little. Published by A. Williams & Co., 283 Washington Street, Boston, 1878.

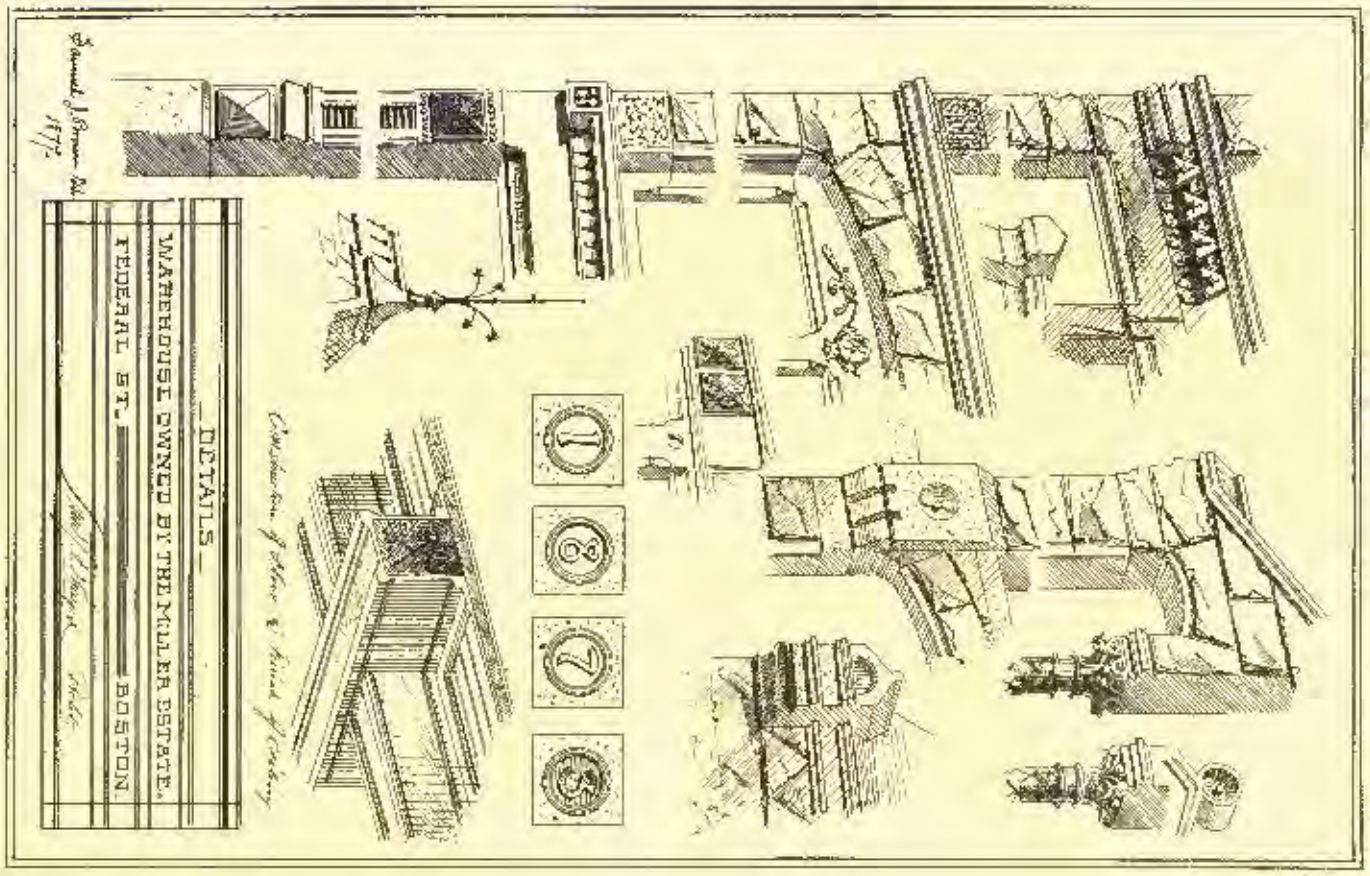


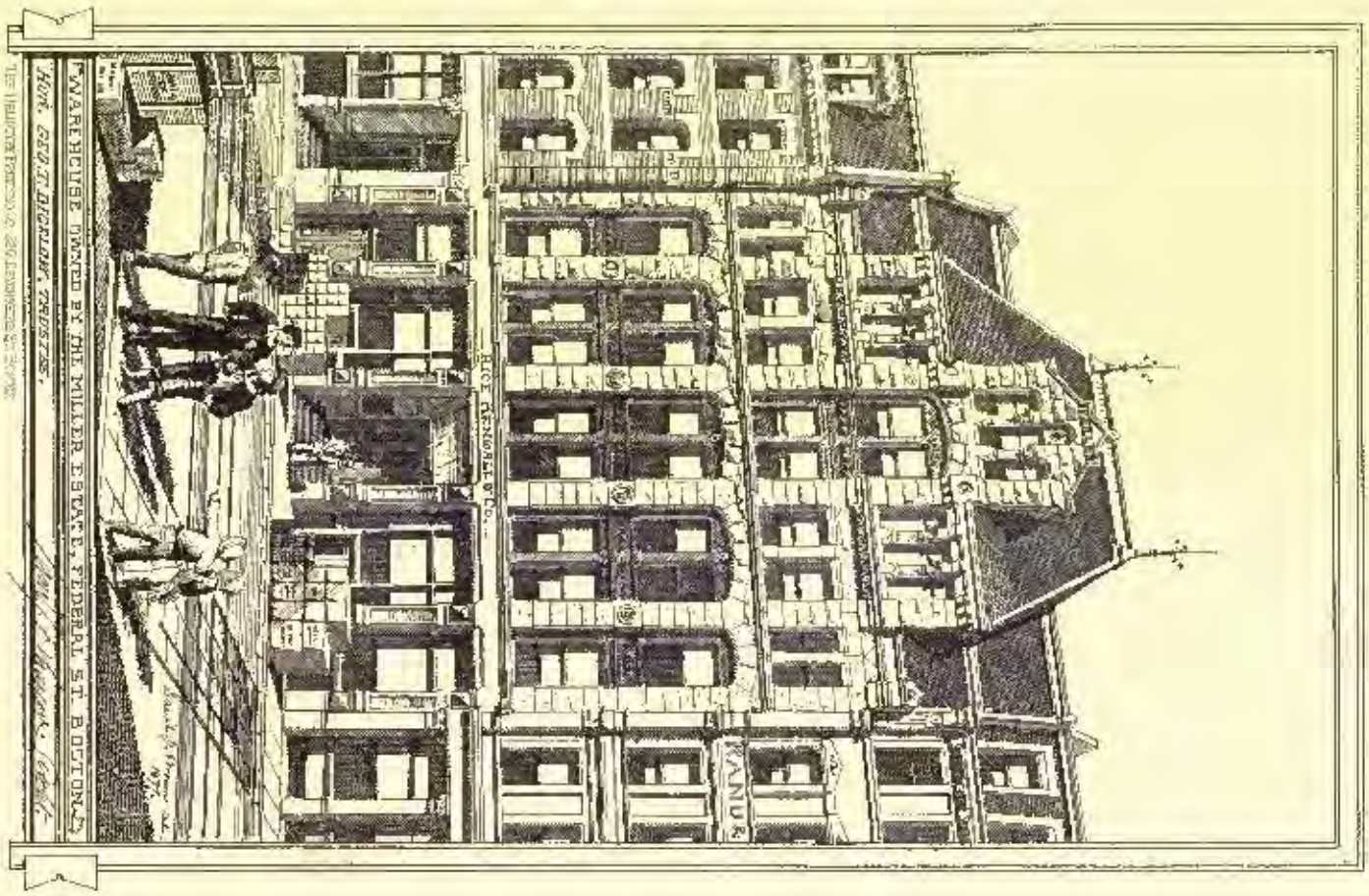
RECEPTION CHAIR.

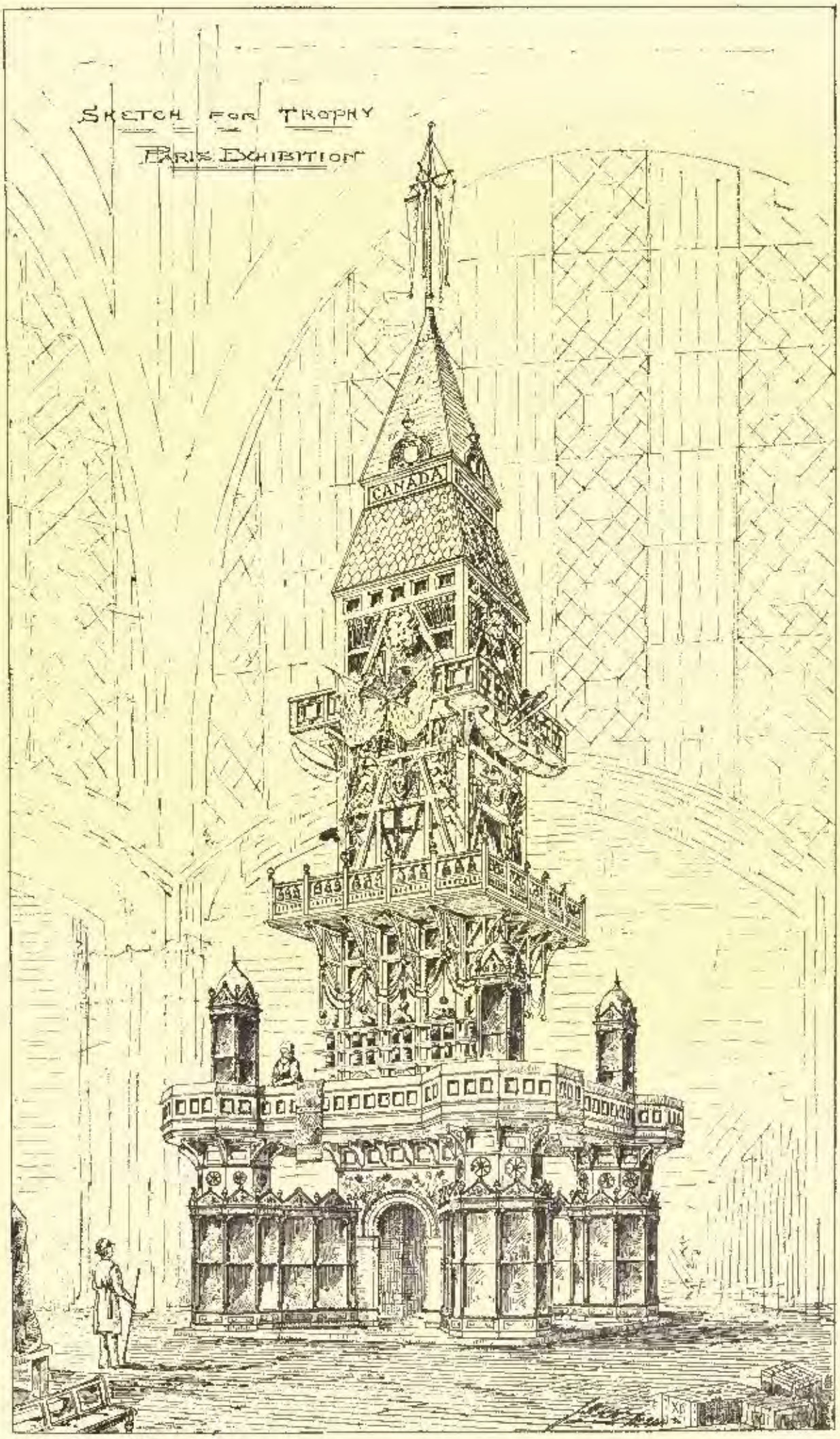


LIBRARY CHAIR AND TABLE.


"The Cottage" at Roger Williams Park


DETAILS
WAREHOUSE OWNED BY THE MILLER ESTATE.
FEDERAL ST.
BOSTON.


WAREHOUSE OWNED BY THE MILLER ESTATE, FEDERAL ST. BOSTON.


SKETCH FOR TROPHY
PARIS EXHIBITION
CANADA

heighten the peculiar charm of the scene. Andirons, logs, hearth-rugs, and fire-irons, for instance, would better set forth the old chimneys than the painfully-drawn summer blinds or screens which fill the void of the fireplace in many of these sketches, and deny its cheerful suggestions.

Now that Mr. Little has been enterprising and ingenious enough to begin for us the work of preserving our antiquities with his pencil, we trust that others may be tempted to carry it on to a more complete and satisfactory conclusion. The materials are ample in all the older parts of the country, the lessons to be drawn from them are much needed, and the demand for them will increase with our civilization.

THE ILLUSTRATIONS.

THE CANADIAN TROPHY FOR THE PARIS EXHIBITION, 1878.

THIS structure will be erected in one of the towers of the Exhibition Building at Paris. The design, after being prepared by the Chief Architect, Mr. Scott, was submitted to the French Legation in London, by whom it was highly approved. It is now being framed at Ottawa, from whence all the necessary materials for its completion will be sent. The trophy will be of wood, one hundred feet in height, in four stages, the lowest of which will cover a superficial area of nine hundred square feet. It is difficult to give a complete description of the trophy as it will appear at the exhibition, but the following articles have been provided for: Canadian wild flowers, exhibits of wheels, gas fittings, and such small articles as do not need to be covered, around the front of the gallery. The shelving upon the second stage will be occupied by geological specimens and such agricultural produce as may be contained in bottles. Festoons of rope, etc., are to be hung from the gallery above. The third stage will be devoted to lumbermen's tools and agricultural implements. Over the doorway on each side of the tower specimens of moose and elk heads will be placed. Suspended from the gallery above are to be some good specimens of Indian canoes; and in the centre of each side of the gallery, groupings of fishing-nets, spears, paddles, buffalo-robes, and Indian work. Four large buffalo-heads will surmount the doorways, and larger kinds of corn brooms and miscellaneous articles will decorate the sides of the tower. The roofing will exhibit specimens of Canadian slates and shingles.

"THE COTTAGE," ROGER WILLIAMS PARK, PROVIDENCE, R.I. MESSRS. STONE AND CARPENTER, ARCHITECTS.

This cottage is now building in Roger Williams Park, by the Union Railroad Company, and is to be used as a restaurant and for the accommodation of visitors to the Park. The octagonal end overlooks the pond, the piazza commanding a fine view of the same. The piazza at the other end is two stories high, the second story being intended for a band stand.

WAREHOUSE NOS. 91 AND 93 FEDERAL ST., BOSTON. MR. S. J. F. THAYER, ARCHITECT.

This building was built in 1873, and with some effort to make it safe against danger from fire. The floors throughout are built with heavy girders from 4' 4" to 6' 6" on centres, covered with 3" plank dowelled together, with an upper floor for finish. Believing that the upper part of a building is most vulnerable, it was a part of the purpose to omit windows near the adjoining estate in the upper stories. The roof is wholly of incombustible materials, iron rafters, with the Cornell lath-iron plastered underneath and covered with concrete, hollow tiles, tar and gravel. The building covers 11,000 feet of ground.

CHAIRS AND TABLE DESIGNED BY MR. EDWARD DEWSON FOR LAWRENCE, WILDE, & CO.

NEW BOOKS.

CEMENT AND IRON.

NOT long ago, a builder distinguished for his thoughtful interest in the details of his profession called our attention to the tenacity with which Portland cement adhered to iron, and expressed his conviction that before long some way would be found of using the two substances together.

This prophecy seems likely to be fulfilled, to judge from the interesting account just published of certain tests made upon beams of concrete with iron ties embedded in them, the invention of Mr. Thaddeus Hyatt.[1]

In studying the theory of a variety of fire-proof floor common in France and used to some extent in other countries, which consists of a tier of rolled iron I-beams supporting, either with or without the help of a network of small rods, a mass of concrete which completely encloses the iron, the idea seems to have occurred to him, that if the lower flange of the iron beam could be conjoined with the concrete by an adhesion equivalent to that with which it is connected to the web of the beam, the web and the upper flange of the beam could be dispensed with, and the resistance to compression which had been the duty of the upper flange could be supplied by the concrete itself, which would require the help of the iron only in resisting the tensile strain upon the portion below the line of the neutral axis.

It a floor could really be composed in this manner of a monolith of indestructible concrete enclosing iron ties, in which the strains and resistances could be calculated with as much certainty as in a floor of brick arches between iron beams, but requiring only one-third the iron, we might consider that the perfect fire-proof floor had been attained; and these experiments show how nearly Mr. Hyatt has realized this ideal.

A Portland cement was specially prepared, he does not tell us how, for resisting fire; and by a remarkable coincidence the co-efficients of expansion by heat of the cement and of wrought-iron, within a range of 180°, were found to be practically identical. How successfully the new cement resisted fire, and how completely the concrete and the iron acted together, is strikingly shown in the experiment described on page 20. A slab of concrete 6 feet long, 2 feet wide and 7½ inches thick, tied with seven flat bars embedded in the concrete, was laid over a furnace, with a clear span of 5 feet, loaded with an average weight of 300 pounds to the square foot over the whole surface, and heated for ten hours, the bottom of the concrete being red-hot for the last five hours. At the end of the ten hours the slab had deflected ⅜ of an inch. Cold water was then thrown by a force-pump against the under side of the slab, and the load was removed; when cool, the concrete was found uninjured, and the deflection had disappeared.

A second trial was made; this time the load was left upon the slab, which during the firing deflected as before, but upon cooling returned to its original level. *Lifting the load with it.*

In practice, Mr. Hyatt finds it advisable to place the flat iron bars which serve as ties vertically, in which position they are better protected by the concrete, and to connect them by wires passing through holes in the ties. These wires prevent the bars from moving in the concrete when under strain.

This simple gridiron of bars ¼ inch thick, threaded upon wires of ¼ inch diameter, is shown by the tabular results of the tests to be sufficient for concrete floors of great span; but architects will welcome the system especially for its applicability to dwelling-houses, where by the new method a few bundles of light bars and two or three coils of wire, with materials for concrete, may take the place of the unmanageable and costly iron beams, and the brick arches whose soffits are ugly when exposed, and difficult to cover with a level ceiling.

Many other applications of the principle will suggest themselves, and the author promises to give accounts of further experiments. To show the extensive range of future use which he foresees for the combined beam of iron or steel and concrete, he considers that it may serve even in bridge construction. However that may prove, there are many other problems which such a material will help to solve; and we shall look with interest for developments of the system from any quarter.

THE PLUMBER AND SANITARY HOUSES.[1]

THIS is a curious book. It is printed in luxurious style, with several illustrations after the manner of the art-furniture catalogues, — not at all bad illustrations, after their manner. Practically considered, it is rather a good sort of book, if read with sufficient knowledge; and, for American practice, if read with due allowance for the severity of our winter climate. Perhaps it would be fair to say that it is a book which ought to find its place in every sanitary library which pretends to completeness; but it certainly should not be taken as a guide to practice in the important matters of which it treats. It seems quite to ignore two most conspicuous and valuable discoveries of modern sanitary engineering: (1) the freedom with which sewer-gases pass through the water-seal of a trap; (2) the effect of sewer-gases in corroding lead pipes. These two principles may be regarded as fundamental, and Mr. Hellyer's obvious ignorance of them disqualifies him as a public teacher. Instead of "the best means for excluding noxious gases from our houses," he recommends some of the most efficient means of introducing these gases.

The book is very much such an one as might have been written by the educated son of a practical plumber, who had taken his ideas of the work from his father's untutored practice; who had sufficient cultivation to write well, and to give a tasteful dress to his ideas; and who had given his mind to the invention (and patenting) of certain minor appliances of the paternal craft.

BOSC'S ARCHITECTURAL DICTIONARY. — The seventh number of Monsieur Bosc's *Dictionnaire Raisonné d'Architecture* has lately been issued. This number carries the work as far as the letter E, and among other subjects treats of Egyptian and Etruscan architecture.

[1] An Account of Some Experiments with Portland Cement Concrete combined with Iron, as a Building Material. Printed for private circulation.

[1] The Plumber and Sanitary Houses: a Practical Treatise on the Principles of Internal Plumbing Work for the Best Means of excluding Noxious Gases from our Houses. By S. Stevens Hellyer. Published by T. B. Batsford, London, 1877.

CORRESPONDENCE.

THE DUTCH ROOM AT HARPERS' PUBLISHING HOUSE.

New York.

Among the new things is one which is not only new but novel; and among the quaint things of the city which visitors bent on seeing its real gems will not omit, the Dutch room at Harpers' may safely be included. It is the outcome of a whim on the part of some of the firm, to surprise certain associate members upon their return from a European tour. The room is also a memorial to the mother of the Harper brothers, whose united effort founded this great publishing house. She was of Dutch descent; and it was resolved to fit up the private office of the firm in true Dutch style. It was to be a room such as might have been found in mansions along the banks of the Scheldt, or in the residences of the rich traders of the Hague. Time pressed, and Mr. J. Cleveland Cady, when given the commission, was urged to all possible speed. No expense was to be spared, but every thing was to be thoroughly honest, without any flashiness or "splurge;" and in this spirit Mr. Cady has given to whoever may be fortunate enough to see the room an opportunity of stepping back to the memory of William and Mary, and of breathing, so far as surroundings go, in a truly Dutch atmosphere. Mr. Cady selected the Flemish type as being more refined in many details and in the general treatment than the pure and simple boer Dutch. The room given him for treatment is on the main business floor of the publishing house, and in plan is about twenty by thirty feet, with a ceiling about thirteen feet high. It has a southern exposure, and its four windows occupy one side almost entirely. An iron column caused some trouble, but when enclosed gave a good corner pier to a couple of closets which fill the offices of sideboard and wardrobe. For not only was the room to be used as a private retreat, but it was especially intended as a place where the members of the firm might meet in friendly chat with the distinguished authors who have always found so hospitable a welcome at the hands of the Harpers. The ceiling is of solid oak timbers placed against the iron-girder and brick-arch construction of the building. This is no treatment of thin panels glued between thin make-believe ribs, but real heavy oak pieces with the ribbed work and coves so dear to the Dutch carpenter's heart. The floor is laid in parquetry. In shape the room is somewhat broken, the closets, some four feet deep, extending down one side about twelve feet, leave a nook into which the chimney is set. In entering the room from the doorway in the corner, the eye falls first and naturally upon this important feature. It may appear strange that the brilliant Dutch tile above the great open fireplace should be wanting; but in omitting this characteristic, Mr. Cady has lost nothing from the spirit of the room, but has been enabled the better to keep to the subdued treatment for which he was striving. The chimney is in red Philadelphia brick, oiled, without conspicuous joints. The arch over the fireplace is a flat segment, with a course of headers in carved brick as *voussoirs*. This carving was done by chisel, and the work is clean and full of verve, without the flatness of moulded work. A broad heavy black marble mantel has three deep arches of brick,—filling niches for rare samples of Delftware. The whole chimney-breast is about seven feet broad, with a projection of over three feet. Above the arches the face recedes; and about the top run other courses of carved brickwork. Immediately below the mantel runs the legend painted in black upon the red brick,—"My flame expires, but let true hands pass on An unextinguished torch from sire to son." The finish of the room is in a high, many-panelled wainscoting of mahogany; (it is all solid), while between the windows and at the door-jambs, also in mahogany, are pilasters with those peculiar Dutch scrolls, which are yet sufficiently toned down to remove any unsightly heaviness. Above the wainscoting the wall is in plaster painted a bluish-green color, well stencilled with a pattern in oil of the same color, but a different shade, while a deep maroon border runs about it. This section of the side walls is some five feet broad, and above it, reaching to the ceiling, the finish is in oak panels containing a series of paintings; this frieze, the panels about eighteen inches deep, extending entirely about the room. On one side the paintings tell a story of the history of America, while upon the other the general subject is the history of printing. These paintings were made by prominent New York artists who were at different times employed by the Harpers. The paintings generally are on a gold or bright background, the figures in black outline filled in with brilliant colors. Over the entrance door, which is in one corner, a panel shows the four Harper brothers—John, James, Fletcher, and Wesley—at their trade. One reads a proof which another has just drawn from a quaint old press; another is carrying two full forms, while the fourth is working at a case. Filling a tall panel on either side are a stork, and a standing figure of Benjamin Franklin. In the next panel a group of monks are busily at work copying manuscripts; next, in narrow panel, the carving on the beech-tree is shown. Gutenberg printing the first Bible occupies the next full panel, while Caxton's standing figure follows in the series, where Albert Dürer is cutting the first blocks for printing from. This fills up one side of the room.

On the opposite side, the first panel next the window has a view of the discovery of America by Columbus, while on the other side the discovery of the Hudson forms the subject of a panel. Old Peter Stuyvesant on the "Battery" is next shown stumping along on his wooden leg, while over the doors of the wardrobe and larder are pictures from New York history, one giving the fight in John Street between the citizens and English soldiers.

On the side opposite the windows are five panels. In the central one, Puck, bearing in one hand a flaming torch, and in the other a telegraphic bobbin of wire, girdles the earth. On one side of this is a view of the arrival of the first ocean steamship in New York Harbor, and on the other the view of a modern Walter press, the latest and best of printing devices. The other panels contain, one the city coat-of-arms, and the other a sage-looking owl. The windows are in a mosaic of colored glass for a height of six feet, then comes a space of clear glass, and above in the heads is more colored glass set in mosaic, the principal lines forming the semicircles and radiating lines so often noted in the sash-bars of old Knickerbocker glazing. Although the glass is colored, it is not at all ecclesiastical in appearance. The Dutch curl is again met with, and many of the smaller circles are filled in with the old style "bull's-eye," in colored glass, in a quaintly-mixed red and orange tint, which, when the sun shines upon or through them, show out with the brilliancy of gems.

The furnishing of the room is in full accord with the general spirit. Along one side, extending from door to window, runs a low book-case with drawers, supported on those characteristic twisted rope columns, tapering at either end. The metal-work is heavy, and only as much as necessity demanded has been used; thus the general effect is not disturbed by any specially brilliant details. A table in the centre of the floor is as fine a piece of honest carpentry as is often seen. The legs have the ribbed bulbs which are peculiarly Dutch, with the egg-and-dart moulding above the edges of the table-top. The chairs, like the rest of the furniture in solid mahogany, are of various sorts, some heavy, with solid timber legs, others with ball turned backs and low bottoms, while on either side of the fireplace are a pair of wooden-bottomed chairs, with legs and backs reminding one of the parts of old spinning-wheels. An old chest bound in iron, and a pair of polished writing-desks or secretaries, heirlooms in the Harper family, are placed in the room; but except these, every thing is designed by Mr. Cady. A fabric in raw silk, full of mixed, low-toned color, is used in upholstering the furniture, harmonizing very well with the general sombre tone. On the hearth rest a couple of great fire-dogs, quaint enough to weave the most fantastic dreams about as the flames from the logs leap about their feet.

The whole room is the quaintest of the quaint,—a place to linger in. New oddities constantly strike the eye, while the frieze of paintings by such artists as Fredericks, Abbey, Nast, Homer, Reinhart, Parsons, etc., are worth a special visit. To the Harpers the room is full of family suggestions; and in occupying it they may fairly be said to live in the very presence of their sturdy ancestry.

W.

CONCRETE BUILDING IN AUSTRALIA.

At a recent meeting of the Adelaide (South Australia) Philosophical Society, Mr. R. Herschel Babbage read a paper in which he described at considerable length the experiments he had made in the past, and was now making, in the construction of buildings composed of a concrete formed of sand, gravel, common earth, and lime. Amongst other buildings a very slight building was erected in 1863, which is used for a still-house; it is 11 feet 4 inches long, by 9 feet wide. The arch only rises 12 inches, or one-ninth of the span. One side of this building is supported by a cellar wall, the other by a wall 15 inches thick; one-third of the arch is cut away at one end, and a dome of about 8 feet 8 inches external diameter is built partially on the old and partially on the new structure. Though the weight of this dome is about six tons, only one very slight crack has been noticed in the whole structure. Besides buildings, Mr. Babbage has constructed several smaller works, such as cattle-troughs and bridges, all of which answer the purpose for which they were designed.

Mr. Babbage has also constructed an entire house of concrete,—walls, roof, staircases, all being formed of the same material,—of which he says:—

"I have never seen a house of this kind; and I have looked through every page of the volumes of the *Builder* for twenty years back, to see if there is any record of such a building having been made, but can find none. I am justified, therefore, in calling it an experiment, and I believe that I may add, a successful one. By using Portland cement concrete,—that is, concrete in which the lime is replaced by Portland cement,—you would undoubtedly have a material which would set much sooner than lime concrete; but whether it would at the end of a thousand years be—as lime concrete has been found to be at that age—as hard as or harder than rock, remains yet to be proved, our experience of Portland cement extending over only fifty or sixty years. The great objection, however, to using Portland cement in any quantity in this country is its high price as compared with lime. Even in England, where the price is, I believe, less than one-third of its price here, they economize by making the walls very thin, a proceeding which does not suit this climate if a cool dwelling is wished for.

On commencing my new house, I determined to make an experiment that should be adapted to ordinary use by its cheapness. I therefore took no pains to wash the gravel, using it as it came from the creeks in my neighborhood. Undoubtedly, by washing the gravel carefully you can make a better concrete; but where manual labor is so expensive as it is here, the extra time employed in the washing would be a consideration. A good deal of the gravel I used was obtained from a gravel-pit in the neighborhood, and verged upon being too dirty to be used. If I have succeeded with such gravel as this, clean gravel cannot fail to be a success. The style which I have adopted is Venetian Gothic, as one which, while sufficiently ornamental, consorts well with flat roofs, and admits of such irregularities as the necessities of my case required. The part to the right of the entrance-porch is built upon the site and partly upon the foundations of the old house. It is two stories in height, each story being arched over, the top of the arches of the ground-floor forming the floor of the rooms above; and, again, the arches of the upper floor form a flat-terraced house-top, such as we read of in the Bible and in accounts of Eastern buildings. Above the top floor is to be an arched corridor, opening into the tower at one end, and facing the terrace roof at the side, so that it will form a pleasant retreat for people to sit in to work or read whilst enjoying the view and the fresh air, thus utilizing in an agreeable manner a part of the house which is entirely unavailable in houses of the ordinary construction. A few iron rings built into the tops of the buttresses will enable an awning to be spread over part of the terrace as a shade when the sun is too hot. The arch of the dining-room is 15 feet in width, with a rise of 2 feet 10½ inches, the rise being nearly one-fifth of the span. The side walls were 1 foot 6 inches inside the house, and 1 foot 10 inches outside, with buttresses at the outer angles. The lime concrete at the crown of the arch is 10 inches thick, and at the springing 3 feet 8½ inches. After the centres were removed, and the concrete was thoroughly set, a layer of 2½ inches of Portland cement concrete — one of Portland cement to seven of fine gravel sand — was spread over it; and finally this was covered with a layer of one of cement to one of sand, ¼-inch to ½-inch thick, which was trowelled to a smooth face to form the floor of the room above. Thus the finished arch was about one foot one inch thick at the crown, and nearly four feet at the haunches. The weight of this arch is about 32½ tons now that it is thoroughly dry, reckoning 1.4 of a ton to the cubic yard. This is about the weight given in architectural text-books, and corresponds with the result of an experiment which I made myself. The weight of the arch of the morning-room is about 23½ tons. The floor of the dining-room is made of 5 inches of lime concrete, with cement concrete and facing above it of the same thickness as those upon the arch. The floor rests upon 18 inches of made earth, it being raised above the natural surface of the ground; and the consequence is that some slight cracks have taken place in the floor owing to its settlement. No cracks are to be seen either in the floor of the room above or on the arch forming the roof of the top room. The weight of the arch of the bedroom above the dining-room is 27 tons, the bow window being continued to the lower story. The wooden centres, upon which the lower arch was built, were left for eleven weeks before being removed, as it is a large arch, and I did not like to risk a settlement; but I am convinced that they might have been removed sooner if it had been wanted. The arch above was not commenced until six months afterwards. As the ribs of the centres are formed with 1½-inch flooring boards, cut to the sweep of the arch, roughly nailed together with ties and struts 1½ inches thick, the chief dependence for supporting the arches during the building is placed upon a considerable number of uprights and raking struts resting upon the arch of the floor below. Thus the whole weight of the upper arch when the concrete was wet (which must have been upwards of 35 tons) was borne by struts resting entirely upon the lower arch; so that the new arch (nine months old) had to undergo a test very much greater than any weight that could ever be put upon it in its use as a habitation. All the arches of the ground floor had to undergo a similar ordeal during the construction of the arches above. In two cases I have had a slight settlement take place whilst the concrete of the arch was quite soft, owing to imperfect strutting; and in a third case I was taking down the centres during very wet weather, — three weeks after the arch had been built, — when we discovered a settlement of the arch beginning to take place from the concrete not being sufficiently set, and we had to put the centres up again. The result was that after leaving the centres up about two weeks longer, when we took them down we discovered a flaw in the crown of the arch. It was the arch over the morning-room, of 11 feet 9 inches span. As the simplest way of remedying this, I cut a hole right through the arch where it was defective, — being about a square yard, — and left the edges of the hole sloping like a keystone; then put up the centres again, and filled in the hole with fresh concrete. All these arches in due time had their cement covering put upon them, which would at once have shown by its cracking if any fresh settlement whatever had taken place. I have now built in this house upwards of sixteen arches of varying size, from 6 feet square to 21 feet by 16 feet 6 inches; and in no one case has any settlement whatsoever shown itself since they had their cement covering put upon them. The only failures — if they can be called so — that I have met with were, on one occasion, the giving way of a barrel-arch 4 feet span, forming a flight of steps, owing to one of the principal props breaking in half and causing the fall of the centring, and the wet concrete put upon it; and upon another occasion when a horse mistaking the house-door for a stable-door, came in upon a new arch, the concrete of which was yet green, when one of its hind legs broke the crown of the arch and went down through it. This damage was, of course, easily repaired by cutting the breakage out as described in the account of the preceding arch, and putting in a new wedge-shaped mass of concrete. There is a small inner hall, showing a gallery round it, level with the floor of the bedrooms to give access to them. This gallery is arched over at top. The arches I have described above are barrel-arches extending the length of the rooms, and having a flat Gothic arch. The ground and upper floors of this inner hall are built differently, as the arched ceilings rise from all four sides, so that the arches intersect each other in the angles, forming groins, and would meet in a point at the centre if carried out entirely; but an octagonal aperture is cut in the top, thus forming the gallery before mentioned. The upper part of the hall above this gallery is also arched over in a similar manner, but an octagon is cut out of it, upon the margin of which is built a dome, 6 feet 6 inches in diameter inside, 9 feet outside, which, including the drum, is 8 feet high inside. The whole weight of this drum and dome, amounting to 21 tons, rests upon the edge of the octagonal opening. The first flight of stairs in my new building consists of a flying arch, the bottom resting upon the top of the arched landing over the stairs below, and the upper end abutting nearly at right angles against the wall of the staircase. Upon the upper surface of this flying arch the steps are cut out, or rather moulded, when the arch is made. In building this arch channels or holes were cut in the face of the side walls against which it rests, so that the concrete of the arch might unite with that of the side wall. Whenever, from any cause during the building, it became necessary to put new concrete against the face of the old work, channels were cut here and there in the old face, to form a better junction between them. After the concrete steps were well set, they were covered with a layer of two inches of fine cement concrete, and finished over with half an inch of fine cement, consisting of one of cement to one of sand; like the floor, the nosing of the steps was formed in the cement concrete by the help of wooden moulds. The surface of concrete walls is well adapted for receiving plaster, as it offers a good natural key for it, and the plaster incorporates itself with the concrete, forming a solid body. For plastering my house both externally and internally, I use a mortar to which a small quantity of sugar has been added. The mixture I adopt consists of fourteen bushels of sand, four bushels of unslaked lime, and twelve pounds of the coarsest and cheapest sugar I can get. I generally mix these quantities at one time in a 'bay.' The sand is put round in a ring, the lime, slaked and riddled, is put inside in the usual manner, and the twelve pounds of sugar dissolved in a small quantity of hot water poured over it, and the whole well mixed together. The original recipe was obtained from Algiers by Col. Hobe, a former governor of this colony, but there was some mistake in the proportions given in it. Those I have given above are the result of a number of experiments that I have made myself. This mortar sets quicker than common mortar, has more adhesive power, and is very much harder; it has, besides, the additional recommendation of being partially waterproof. I have used for lining baths, small tanks, etc., a mortar mixed in the proportion of 1½ sand to one of lime, with ¼ pound of sugar added to each gallon of the mixture, and found it quite waterproof. The theory of it I take to be that the sugar combines with the lime, and forms a saccharide of lime, which is only sparingly soluble in water. The string-course, cornice, and mouldings over the windows are made in concrete by applying wooden moulds of the requisite forms to the place where these ornaments are to be put, and filling these moulds with concrete. I find that by lining the moulds with damped paper I obtain a better surface, and that it is easier to detach the moulds. For the outer surface of the mouldings I use 'sugar-cement concrete' made of four bushels of fine gravel, one bushel of lime, and six pounds of sugar. The moulds are lined with this fine concrete, and then backed up with the ordinary concrete, so that the mouldings form a solid projection of the substance of the wall itself."

Mr. Babbage's paper was illustrated by a number of diagrams.

In answer to questions, Mr. Babbage said that he considered the cost of concrete under ordinary circumstances would be 25 per cent less than stone or brickwork, and even with that decrease in cost much thicker walls might be constructed, which was a great consideration in the climate of Australia. His house was cooler in summer and warmer in winter than most houses. — *The Builder.*

THE ST. LOUIS CUSTOM HOUSE TRIALS.

THE construction of the new Custom House at St. Louis has from the start been under the direction of Mr. Thomas Walsh as superintendent, and till recently of William K. Patrick as assistant. The walls are now nearly three stories high above ground.

In the summer of 1876 the Grand Jury of the United States

District Court at St. Louis made a preliminary investigation of certain charges of dishonesty in the construction of the new Custom House, but left the work incomplete. At its November session, 1877, however, three indictments were found, one against Messrs. Walsh and Patrick for conspiracy to defraud the government, and one each against Lyddan the master mason, and Runyan the master carpenter, for perjury in testifying that certain piers built under their direction were solid when they knew them to be otherwise.

By orders from Washington the trial of Lyddan was taken up at once, although the prosecution was not prepared with all its evidence, and had to ask several intermissions until permission could be obtained to cut into the piers and ascertain their construction. Three piers out of over a hundred were tapped, and were found in each case to contain a cavity filled with broken stone and cement. Permission was sought to explore upward in order to determine the vertical extent of this filling; but the superintendent refused, on the ground that the stability of the superstructure would be seriously endangered thereby. Messrs. Henry Flad, chief engineer in charge of the construction of the St. Louis Bridge, and C. Shaler Smith, civil engineer, testified that if this filled hollow were properly capped with large stones above, no harm could come from the proposed exploration; but that if it were not so capped, but the cavity continued up through the height of the pier, further boring would indeed imperil the work above, and that in that case the whole must be styled bad masonry.

Since the required permission was withheld, the prosecution rested here, and the jury gave a verdict of acquittal. The case turned largely upon the question whether or not the kind of work done could properly be styled "solid masonry," as Lyddan had pronounced the piers to be.

Runyan's case followed. He had declared the piers to be of "solid stone," "as solid as the Rock of Gibraltar itself." The judge, however, instructed the jury to acquit Runyan on some legal technicality, although his indictment was identically the same with Lyddan's, save in the name of the accused.

At the request of the United States prosecuting attorney, the case of Messrs. Walsh and Patrick has been transferred from Judge Treat, before whom the above cases were tried, to Judge Dillon, and is set for the January term of 1878. *

THE RECENT BUILDING ACCIDENT AT ST. JOHN, N.B.

St. John, N.B., Jan. 3, 1878.

Editor American Architect and Building News.

Sir,—An article has just been laid before me, published in your issue of Dec. 22, 1877, relating to the recent disaster to the Walker buildings in Prince William Street in this city, of which Mr. John C. Babcock of New York was the architect, and which in their fall damaged seriously the four-story brick store of Messrs. J. and A. McMillan adjoining, of which we, Croft and Camp, are the architects. The article referred to is quite inexact in its inferences, as the statement concerning imperfect construction and weakness of the McMillan building is an absolutely mistaken one. The destruction of the Walker buildings, it is now generally conceded by the leading experts of the city, was caused by the immense volume of water that fell during the last twenty-four hours previous to the accident; the cambered floors being boarded close before the roof was on, forming a complete water-shed that discharged into the central wall, leaching away the lime from the mortar till it ran down the sides of the wall like milk, leaving a mass of wet sand and bricks which caused the central wall to slip and buckle, as was seen by several eye-witnesses; and that portion of one side wall of the McMillan building that fell was wrenched out by the falling of the heavy timbers of the Walker building solidly anchored to it. The statement made by your correspondent concerning Messrs. West and Anderson in the same article is also erroneous. In conclusion I ask you most respectfully to publish this article at the earliest possible date by way of reparation of the possible damage that may result from the article in question.

I am, sir, very respectfully yours,

G. B. Croft.

NOTES AND CLIPPINGS.

The Stewart Memorial Cathedral.—Mr. R. H. Park, the sculptor, has made drawings of designs for three statues for the interior of the Stewart Memorial Cathedral at Garden City. They will be of heroic size, and typical of "Everlasting Life," "Religion," and "Hope." Two of them are designed to fill niches over the two Stewart memorial tablets, and the other is to crown the apex of the chancel arch.

A Filter to Purify Air.—At a recent meeting of the New York Academy of Useful Arts, attention was called to a simple method of filtering the air of an apartment. The object is to free the air from dust, excessive dampness, and possibly from the germs of malaria. The contrivance consists of a fibrous woven fabric, strengthened by brass wire. It is to be applied to windows and ventilators, and may be of service on railway cars to exclude dust. It has at least the merit of checking draughts, while admitting air.

College Dormitories.—Our attention has been drawn to the insecurity of college dormitories—that is, if we may generalize from the examples so near at hand—by a statement that long-needed fire-escapes have at length been put upon Matthews Hall at Cambridge. There are few buildings more exposed to the chance of burning, there are few buildings which it would be harder to escape from than some of these lofty building of more recent date, and there are few buildings to whose security from fire are intrusted lives more valuable to the country than these same college dormitories throughout the land. Thanks to late students, early risers, and students' servants, the buildings are not left for more than three hours out of the twenty-four without being the object of a certain supervision, superficial though it be. But students have a right to demand something more than this negative security; and it is to be hoped that the authorities of Harvard College at least will no longer overlook a lack which casts discredit on their provision and their appreciation of the position they hold as the guardians as well as instructors of the young men who are intrusted to their charge.

Indiana State House.—The State House Commissioners of Indiana have received the following instructions as to the nature of their report:—

1. Can the building be completed according to the plans and specifications within the limit named in the law, namely, $2,000,000?
2. Are the foundations in character and extent sufficient to support the superstructure in such manner that no injury is to be apprehended to any point of the work from settling or crushing?
3. Are the materials of the superstructure in kind and quality such as to insure stability and permanence?
4. Are the combinations of materials such as to give strength and security to the entire structure, regard being had to the methods of spanning spaces between walls, constructions of roofs, domes, and towers, supporting stairways, or other dependent portions?
5. Are dangers from fire sufficiently provided against?
6. Having regard to convenience, adaptability to the purposes required, harmony and dignity of the work, are the arrangements adequate for light in the corridors and rooms and offices, artificial by day, and gaslight by night? Is the building thoroughly ventilated?
7. Is ample provision made for safety, heating the building in all its parts, is also the needed supply of water easily and conveniently accessible?
8. Is drainage amply provided for?

Your opinion is also requested as to architectural symmetry, beauty and harmony of parts, including ornamentation and general conformity to the dignity, resources and progress of the state.

The Bennington Monument.—The erection of the battle monument at Bennington, Vt., is still contingent on raising a large sum of money which is to be obtained by private subscription. Until this sum has been raised, the association intends to abstain from all communication with artists, sculptors, or architects. Still it will be well for architects to bear in mind that they may presently have an opportunity of designing a monument for an association which seems to desire to conduct its trust so as to secure the best results. The designs will, when submitted, be examined only in consultation with the governors of Vermont, New Hampshire, and Massachusetts.

The Brooklyn Academy of Design.—The unhewn stone in the tympanum over the doorway of the Academy of Design in Brooklyn, which has so long remained unfinished, is shortly to have carved upon it a bas-relief, which will represent Michael Angelo when, as an old man deprived of sight, he is examining by touch, as was his habit, the works of the sculptors among whom he is seated.

The Permeability of Building Materials.—A series of experiments has been making in Paris by Professor Marcker and Dr. Berthold to determine what substances used in building are permeable by gases and vapors. It was found that bricks, sandstone, shelly tufa, mortar, and cement permit vapors to pass freely through them if they are not kept under water. Substances absolutely impermeable are granite, porphyry, slate, alabaster, limestone, and marble. One conclusion to be drawn from this is, that houses built in places where dangerous gases exhale from the ground are not made absolutely safe from this danger by cementing the cellar-floors, or by laying them with brick or tile, though of course these precautions do something to make the building a more sanitary dwelling. Whitewashing a wall does not make it less viable to noxious gases; but two coats of oil-paint will make it practically impermeable. Thin paper-hangings reduce the permeability of mortar seventeen per cent, and thick glazed paper forty per cent. More attention should be paid to making the walls and floors of cellars impermeable by gases, especially those under which a sewer passes; for as shown by these experiments, the bricks of which the sewer is built offer but little resistance to the passage of sewer-gas which in the winter time, at least, will be drawn up into a heated house more readily than it can work up through cold or frozen earth.

An English Monastery.—A monastery for a body of Carthusian monks has just been founded in the neighborhood of London. The buildings cover about nine acres of land. The great size of the monastery is due to the laws of the order which compel each monk to live by himself and to keep perpetual silence. To counterbalance the rigor of these rules each monk is allowed three rooms of moderate size, which often form individual houses, and a small garden where he can raise his own vegetables. The order, which was founded by St. Bruno in 1086, has been a powerful one, and to it is due the convent La Grande Chartreuse near Grenoble in France, and the still more famous Certosa near Pavia. In England the name Chartreuse-house, which their first monasteries in England bore, became corrupted to Charter-house, a name which is associated in most persons' minds with the famous religious asylum in London founded by Sir Thomas Sutton, where eighty poor brethren over fifty years of age are supported, and, also, between forty and fifty scholars who must be the sons of poor gentlemen: besides these there is a large number of day scholars and extra boarders. The title of the order was taken from the name of its first monastery in Dauphiny, Chartreux, the Latin Cartusium.

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At the annual meeting of the American Social Science Association in Boston, last week, the secretary read a paper on "Homes for the People." He said that, in pursuance of an act of the Massachusetts legislature, presented by some members of the association, and passed last spring, to legalize Co-operative Saving Fund and Loan Associations, after the manner of those in Philadelphia, some six or eight of such associations had been formed in the State, chiefly in Boston, Cambridge, and Lynn, and were prospering. Inquiries made in Philadelphia had shown that the associations there had borne the pressure of hard times very well, — better, it was said, than most of the savings-banks of the country, — in spite of the hardships and difficulties which their members had met. There were signs of improvement in the condition of tenement-houses in Brooklyn; and in New York a plan was on foot for raising some hundreds of thousands of dollars to be invested in building such houses, after the example of Mr. White of Brooklyn (of whose successful experiments in this way we have more than once spoken). The secretary quoted from Mr. White an account of the financial success of this undertaking, wherein it appeared that about seventy thousand dollars, invested in the course of the last two years in two buildings for the housing of eighty families, had this year borne a net income of seven and a quarter per cent. This confirmed him in his opinion that "decent, healthy houses in flats (the ground being too dear for small houses) can be provided on New-York Island, paying a reasonable interest, — six per cent or more." He had, however, confined his attempts to Brooklyn, where he was building a block two rooms deep and two hundred feet long, and was expecting to invest some two hundred thousand dollars with confidence of a return.

THE details of Mr. White's investment are instructive. The "Home Buildings" on the corner of Hicks Street and Baltic Street, Brooklyn, are two blocks, one fronting on each street, and occupying together a lot of land 105 by 152 feet, whose cost was $10,500. The Hicks-street building cost (allowing for its share of the land) $39,485. It contains forty tenements, or dwellings, whose rent for nine months was $2,742.50; and four shops, which have been rented seven months for $865. This is at the rate of $5,122 per year. The annual outgo, including taxes, water-rates, janitor's and other running expenses, and an allowance of one and a half per cent on cost for repairs, is set at $2,072, leaving $3,050, or nearly seven and three-quarters per cent, for the return. The Baltic-street building, apparently finished later, and containing likewise forty dwellings, will yield eight per cent. It appears from this trial, that to have a net income of seven per cent requires twelve and a quarter per cent in gross receipts. The rents for the tenements of three rooms are from $1.40 to $1.90 per week, those in the upper stories being the cheapest; for four rooms, from $1.90 to $2.70 per week. For similar tenements in New York, Mr. White estimates that it would be necessary to charge a quarter more, or, for three rooms, from $1.66 to $2.26 per week, and for four rooms from $2.26 to $3.21, — prices which he thinks would at once bring the rooms into demand. The shops in the Hicks-street building rent for from $25 to $40 per month. The most conspicuous part of Mr. White's success is his success with his tenants. Among fifty-three families that held rooms in the Hicks-street building during the ten months that it was occupied, there were only thirteen changes; and only four failed to pay their rent promptly. Their behavior and their reasonable care of lodgings are indicated by the fact that only one family was ejected for disorder, and only two for damage done, and by Mr. White's recent note, that "repairs to water-works, etc., have not yet cost me one cent." A system of discount to those who paid their rent for several weeks at a time — presumably in advance — resulted in nearly two-fifths taking advantage of the discount. These things, of course, show that such houses attract a better than ordinary class of tenants. So far, this too is an encouragement to capitalists, and it certainly will be an immense gain when these classes are fully provided for. Yet, when the demand of the thrifty and well-behaved is supplied, the provision of such houses as a paying investment must stop; and then the question remains, whether, in the interest of public health and order, any thing can be done for the unthrifty and disorderly.

THE Superintendent of Buildings in Chicago not long ago rendered his annual report. In it he said that he had made a survey of all the theatres, public halls, schools, and churches in the city, and had served notices on the lessees and managers of theatres and halls, directing what should be done to make them safe for the public. While some of the managers complied with the requirements of the superintendent, others refused; and there was no law to compel them. He therefore urged the speedy passage of laws to regulate the planning and construction of such places of amusement, but apparently with no great hope, for he added, "I fear they will remain in their present unsafe condition until some public calamity similar to the burning of the Brooklyn Theatre occurs, when public sentiment will be aroused, but too late to save valuable lives and property, the loss of which must inevitably result, in case of fire in some of our theatres or public halls." The subject has been brought before the city government, and we are reminded of the astuteness with which the Chicago inn-keepers staved off the impending legislative restrictions upon them after the fatal burning of the Southern Hotel some months ago; for it appears that the board of aldermen has contumeliously rejected the ordinance for the security of theatres. The ordinance was apparently well drawn, and contained the minimum restrictions that are recognized as necessary for safety, — the provision of proper exits and stairs, of stand-pipes and hose, of a brick fire-wall next the stage, and a prohibition against putting auditoriums too high up in buildings. But the committee which reported on it directed its attention to the dangerous condition of the audiences rather than of the buildings, declaring that "the fashion of trailing dresses has more to answer for in the frightful calamities that have happened to panic-stricken assemblies than any fault in the construction of buildings." No law regulating dress was enacted, however, it would appear; and the building ordinance failed to pass; so that the audiences of Chicago are left without protection; the aldermen thinking, perhaps, that the fashion of a dress would outlast even a fire-proof theatre, and that if people will get into a fright, and upset each other on the floor, they may as well be burned there.

THE building of the Indiana State Capitol seems to have been looked upon, from one side or the other, as likely to furnish a golden opportunity, or a dangerous provocation, for some kind of hocussing. The legislative act to secure plans for the building surrounded the competition with a net-work of difficulties in which, we should think, no honest and discreet architect would have dared to risk entangling himself. This, however, did not deter Mr. John W. Blake from distributing the seductive letter to architects, which we printed in our number of June 2, 1877; and now we read that a similar letter (anonymous this time, it is said) has

been honorably exposed to the State House Commissioners, by Mr. Meyers, an architect of Detroit, to whom it was addressed, in which the writer offered to use influence to get Mr. Meyers's plan adopted. The commissioners have thereupon incontinently dismissed their secretary as the guilty person, without waiting for his examination, which is to follow. The path of the architect must be thorny in a State where it is necessary to put him under enormous bonds to insure the perfection of his plans, and the accuracy of his builder's estimates; and where the prospect of this indulgence is enough to stimulate such profuse offers of underhand assistance.

We alluded in our last number to the studies which the prize students in architecture at the French Academy in Rome are required to make and send home to Paris while they are maintained at the government expense. In the last-named number of *La Semaine des Constructeurs* we find the report of the academy on the *Envois* returned by the students in 1878. "The academy," says the report, "attests with great satisfaction the superiority of the *Envois* of the resident architects in this year over those of past years. It is long since it has been able to receive work of this kind with such entire praise, — praise from which the slight reservations it has made are no detraction." The study of the first year's student, Mr. Paulin, is of the portico of the Pantheon at Rome, and of several buildings at Pompeii. It is singled out for special commendation. Those of the other students, or resident architects, as it will be seen that the report calls them, are the Temple of Castor and Pollux and the Temple of Concord at Rome, a restoration of the Erechtheium, and another of the Mausoleum at Halicarnassus, with some smaller studies of Renaissance work, chiefly of the civic palace at Brescia, the work of Sansovino and Palladio. It will be noticed how strictly the academic tradition is maintained. The whole labor is spent upon classic work, excepting for a few slighter studies in the stricter Renaissance. Not a glance strays in the direction of mediæval archæology or architecture, a notable contrast to the activity of their fellow-architects on the opposite side of the channel. And here we may suggest that the establishment of travelling scholarships in architecture is one of the things which Americans might well undertake. There are no artists, especially no architects, who need travel so much as Americans, because there are none who have so little to study at home. Private or corporate liberality could do nothing better to help the education of our profession than in founding such scholarships. It is not likely that their work would be of great value, except to themselves and to students like themselves; nor is it important that it should. It would not for a long time, perhaps, add to the stock of archæological knowledge, or bear such splendid fruit as has the work of the French *pensionnaires;* but its direct and indirect influence in education might be very great.

A curious case has lately come before the English courts, likely to call out the sympathy of all artists in behalf of one of their calling who has appealed in vain for the protection of the law against forgery. Mr. Herbert, R.A., was one day waited on by a picture-dealer, who told him that he had bought from another picture-dealer a painting bearing his signature, and requested him to authenticate it. The price actually paid for the picture was ten or twenty pounds; but, accepted as the work of Mr. Herbert, it would be worth two hundred and fifty, for which reason the dealer was naturally anxious to have it acknowledged. Mr. Herbert at once declared it a forgery, and insisted that the dealer should sign an agreement not to sell it as genuine. This, however, the dealer refused to do, asserting that the picture was genuine, and maintaining his purpose to sell it as such; whereupon Mr. Herbert seized it, and detained it as a forgery, leaving the dealer to his remedy at law. The dealer sued to recover the picture, with damages for its detention. The Court, after a full hearing, decided, not apparently without indicating its sympathy with the painter, that the picture was the property of the dealer, and must be returned to him uninjured, even to the false signature; that the defendant was liable for its value if it was not so returned; and that it was for the jury to determine the value, and the damages to be awarded for illegal detention. The jury appraised the picture at ten pounds, and awarded one shilling damages for the detention, leaving to Mr. Herbert, apparently, the option of destroying and paying for it, or seeing it go forth to be sold under his name, and, in either case, the pleasure of paying his own lawyer's fees. It thus appears that English law (and, we suppose, American) gives an artist no protection against counterfeiters. He might secure it, we presume, by copyrighting a trade-mark, and affixing it to his pictures; but, if he is unwilling to do this, he must submit to be blackmailed, like Mr. Herbert, when any one thinks it worth while. If he would suppress counterfeits, he must do it at his own cost, by seizing them when he can (like the Academician who had, it was whispered, in a previous instance broken one over the head of a dealer), and paying damages therefor; and, failing this precarious remedy, he must submit.

A WORD TO CONTRIBUTORS.

The beginning of a new year gives us an opportunity to make acknowledgment to the many friends who have helped the interest and usefulness of our paper with their contributions. This acknowledgment is especially due to those whose assistance has been unsolicited, — assistance of which the welcome is not to be measured by the scanty recognition of it which it is possible to give in individual cases. We wish, once more, to remind our readers how much the value of our work may be increased by their co-operation. As we have said before, it is impossible for us to know where all the material is to be found that would be valuable to us, and we must depend, therefore, in a good measure, upon what may be voluntarily offered. This is especially true in regard to matter for illustration. The topics and news which it is worth while to touch upon can be discovered and collected with fair success by a reasonable effort of editorial diligence, though here, too, help from without is always valuable; but in a country so wide, and cities so scattered as ours, it is impossible for us to be on the watch for all that would serve us for illustration, and we must rely in a good degree on spontaneous assistance. There is, in fact, no other means by which we can make our paper what we should like to have it, — a sufficient record of the best work that is done in American architecture. It does not need the comments of foreigners to remind us that the greater part of such work goes unrecorded at present; and, from our point of view at least, it is very undesirable that this should be the case. We therefore invite our readers once more, wherever they may be, to favor us with designs or drawings of any important work they may have in hand; and we shall be glad if correspondents, regular or occasional, will bring to our notice work that it is desirable to illustrate in our pages. The difficulty of purveying for ourselves is increased in the case of work which is not where it can be publicly seen, especially decorative work and furniture, of which we should like to publish more than we do, but which it is impossible for us to search out in the private places where it exists.

We should not ask assistance from our readers, if we did not know that it is no less in their interest than in that of editors to make their technical journals as good and as catholic as possible. There is, nevertheless, one difficulty which must necessarily arise, and has occasionally been brought to our notice with some emphasis. It is not possible for us to publish every thing that is sent; and, ungracious as it may seem to ask for things when there is a possibility that we may not use them, we are obliged to claim indulgence in this respect, and to beg those who find that we have no use for what they are good enough to send to take our return of their contribution in good part. We now and then receive letters of complaint, sometimes of indignant complaint, from subscribers whose contributions we have had to return unused. We must therefore qualify our general invitation by saying, that, glad as we are to receive such help from all sides, we do not invite it from persons who are not willing to leave us the option of declining it, and without offence, if we do not find it suited to our purpose. To agree that subscription to our paper, or other favors, should confer a right of representation in its pages, would be to abdicate the editorial function altogether. Our friends will certainly not wish to deprive us of the semblance of authority, when we cannot divest ourselves of responsibility. It is the aim

and expectation of any journal to render in itself an equivalent for its subscription-price: without this expectation, it would be unreasonable to ask for subscribers. Those of our friends who give assistance other than their subscriptions will give it, we are assured, from interest in the cause we represent, — the support and improvement of our profession and its allied arts, — not as a favor to the editors or the publishers, and therefore not as involving a right of control over them, for that is what a right to insert contributions must really imply. An editor must perhaps resign himself to encounter now and then those who find an affront in the return of their contributions, or even make it the occasion for an accusation of favoritism. But they know little of his position, who are not aware that it is one of its chief gratifications to discover new contributors, as it is one of its chief surprises to learn how many people there are to whom it is incredible that an editor could by any honest possibility fail to admire their productions, or to find them useful.

For ourselves, we are as far as possible from claiming infallibility, or from supposing that we do not make mistakes. The gradations about any line of selection are necessarily close, and it cannot be supposed that different people would quite agree concerning them, nor can we hope to altogether avoid errors of judgment. Nevertheless, selection is an absolute necessity; and we may say frankly that we believe our faults to have been on the side of acceptance rather than of rejection. This is not an inviting topic, and we do not propose to continue it, but only to assure our friends that we mean to be impartial; that we wish to make our paper as good as we can, — an object which is of more importance than any personal favor, — and that it is always a satisfaction to an editor to welcome a new contributor, — a satisfaction which is more likely to lead him into errors of leniency than is any personal admiration to mislead him into exclusion.

PAPERS ON PERSPECTIVE.

II. — PHENOMENA RELATING TO THE PICTURE.

In the last paper we considered the phenomena of perspective in nature; that is to say, certain appearances of the geometrical lines and surfaces with which perspective has to do.

Let us now — leaving till another day all question of magnitudes and of the exact determination of forms — consider in like manner the principal phenomena, the main characteristics, of a perspective drawing.

In so doing we will leave all *quantitative* determinations till by and by, and assume, or guess at, any dimensions or other data we may need; or determine them by judgment, or by the eye. But as this is just the way that such data are always determined when sketching either from nature or from the imagination, it follows that these considerations are specially interesting to the artist and the amateur, since they comprise almost every thing that he needs in his own work.

16. The picture is supposed to be drawn upon a plane surface called the *plane of the picture*, and so drawn that if the picture were transparent, every point and line of the drawing would cover and coincide with the corresponding points and lines of the objects represented, as seen from a given position, the station point; the plane of the picture being at a given distance and in a given direction.

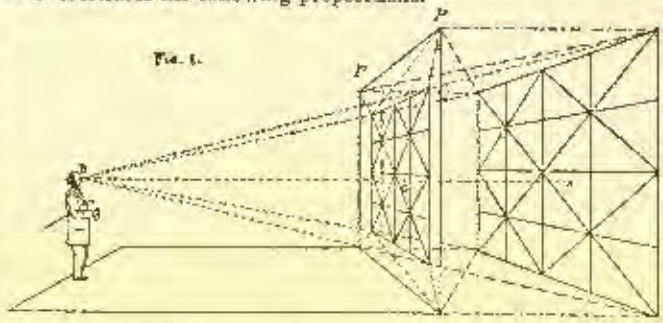
17. The distance and direction of the picture are taken upon a line passing through the station point, at right angles with the plane of the picture. This line is of course an axis of that plane (1). It is called *the* Axis. If the Axis is horizontal, the picture is vertical, and this is the usual position. But if the Axis is inclined to the horizontal plane, the plane of the picture is at an angle with the vertical direction, as sometimes happens.

18. The point in the plane of the picture nearest to the eye, or Station point, S, is called the Centre of the picture, C. It is the point where the Axis pierces it. The distance from the station point to the Centre is the length of the Axis.

19. The representation in a perspective drawing of a point, or line, or of the vanishing point of a line or system of lines, or of the vanishing trace, or horizon, of a plane or system of planes, is called the *perspective* of the point, or line, or vanishing point, or trace.

Figure 1 represents the picture-plane, PP, as a transparent plane on which are drawn the perspectives of the lines behind it. The perspectives of the lines drawn on the vertical plane behind it, and which are consequently parallel to the plane of the picture, are parallel to the lines themselves, whether horizontal, vertical, or inclined, and though shorter, they are divided proportionally to them. The lines in the planes at right angles to the plane of the picture, however, appear changed both in magnitude and direction. This illustrates the following propositions.

FIG. 1.



20. Lines parallel to the picture-plane, whatever their direction, have their perspectives drawn parallel to themselves; that is, in their real direction. The magnitude of the perspective of any such line is less than that of the real line, according as the distance of the line itself from the picture is greater, but its parts are proportional to the corresponding parts of the line represented.

21. When such lines belong to the same system of parallel lines they have their perspectives parallel to each other, and to the lines themselves.

22. The perspectives of lines not parallel to the plane of the picture are not parallel to the lines themselves, nor to each other, but are drawn converging towards a point which is the perspective of their vanishing point. In this case, as the real lines *seem* to converge towards their real vanishing point, so their perspective representations *do* converge towards the perspective of their vanishing point.

23. Hence if the picture-plane be vertical, as it usually is, the perspective of the horizontal lines that are *parallel to the plane of the picture* will be horizontal and parallel, that of inclined lines parallel to the picture will be parallel and inclined at the same angle with the lines themselves, and that of all vertical lines will be drawn vertical and parallel. All other systems of lines will have their perspectives converging to the perspective of their vanishing points.

24. Of the two vanishing points belonging to every system of lines (5) one will, in general, be behind the spectator, and one in front of him; this last will be behind the plane of the picture, and its perspective will be somewhere in the plane of the picture, and at a finite distance. But if the lines of the system in question be parallel to the plane of the picture, the perspective of both vanishing points will be at an infinite distance upon it, in opposite directions; and lines drawn to them will, of course, be parallel.

25. It is often asked why the apparent convergence of vertical lines is not represented by the convergence of their perspectives, just as much as that of horizontal lines. It is, just as much. For it is only those horizontal lines *which are inclined to the picture* whose perspectives are drawn to a vanishing point. The perspectives of lines parallel to the picture are drawn parallel to themselves, just as those of vertical lines are. And when the Axis is inclined so that the plane of the picture is no longer vertical, and vertical lines are no longer parallel to it, they, too, are drawn converging, one of their vanishing points, either the zenith or nadir, being now behind the picture, and its perspective at a finite distance upon it.

This case will be discussed hereafter.

26. Moreover, although lines parallel to the picture, whether vertical, horizontal, or inclined, do seem to converge towards a distant vanishing point just as other lines do, it is not necessary to represent this convergence, since their perspective representations in the plane of the picture also seem to converge as they recede from the eye, and in the same degree, covering and coinciding with them. The perspective lines are themselves foreshortened and the space between them diminished by distance.

27. To obtain this effect, however, in due degree, as, indeed, to obtain the just value of all other perspective effects, the eye of the spectator must remain at the station point. From other points the picture necessarily looks inexact or distorted. These distortions increase from the centre outward; and since it is so inconvenient as to be practically impossible to keep the eye always at the station point, it is best, in order to keep this distortion within reasonable limits, not to extend the picture more than 60°, i.e., not to make it wider than its distance from the eye.

Some other phenomena relating to perspective drawings are represented in Figure 2 (Plate I.).

In this plate, though a variety of objects are indicated, only one direction of each kind is employed. All the right-hand horizontal lines belong to a single system, and all the left-hand lines to another. This of course would not happen to this extent in nature; but we have imagined, for simplicity's sake, that in the scene represented all the buildings are parallel, and that all the roofs are of the same pitch.

The Centre of the picture, C, the point nearest the eye and opposite the station point, S, is here not exactly in the middle of the pic-

ture, but considerably to the right, being just below the church on the hill. The station point is about six inches from the paper; and the eye must of course occupy this position in order to make the things represented appear of their proper shape and size. This picture subtends an angle of more than 80°.

28. In this plate, the following notation is adopted, a notation that will be adhered to throughout these papers. Each direction is indicated by a single letter, the direction of each system of planes by two letters, which give the direction of two elements of the system; each vanishing point by the letter V, with the letter denoting the direction of the lines to which it belongs written after it; and the trace of each set of planes by the letter T, and the letters denoting the plane.

LINES AND THEIR VANISHING POINTS.

Lines.	*Their Direction.*	*Their Vanishing Points.*
Z.	Vertical. (To the zenith, or nadir.)	(V^z) Vanishing point of vertical lines.
R.	Right hand horizontal. [i.e., horizontal lines going off to the right.]	V^R " " " Right hor. lines.
L.	Left hand horizontal.	V^L " " " Left " "
M.	Right hand inclined upwards.	V^M " " " Right incl. "
M'.	" " " downwards.	$V^{M'}$ " " " " " "
N.	Left " " upwards.	V^N " " " Left incl. "
N'.	" " " downwards.	$V^{N'}$ " " " " " "
P, Q } P', Q' }	Inclined lines formed by the intersection of planes.	V^P, V^Q } " " } Lines of intersection. $V^{P'}$, $V^{Q'}$ }

If there are several lines having the same general inclination they may be distinguished by figures, as R^1, R^2, R^3, etc. Special vanishing points may be indicated as V^1, V^2, V^3, etc.

PLANES AND THEIR VANISHING TRACES (OR HORIZONS).

Planes.	*Their Direction.*	*Their Vanishing Traces.*
RZ.	[Any plane of the system which contains, or is parallel to R and Z, i.e., right-hand vertical planes.]	TRZ. Trace of the right-hand vertical planes.
LZ.	To L and Z, i.e., left-hand vertical planes.	TLZ. Trace of the left-hand vertical planes.
RL.	To R and L, i.e., horizontal planes.	TRL. Trace of horizontal planes (i.e., THE HORIZON).
RN.	To R and N, " inclined up to the left.	TRN. Trace of the planes RN.
RN'.	To R and N' " down " "	TRN'. " " " RN'.
LM.	To L and M, " up " right.	TLM. " " " LM.
LM'.	To L and M' " down " "	TLM'. " " " LM'.

29. The position of the various vanishing points, as well as the dimensions of the various objects, are supposed to be obtained, in this picture, as they would be obtained in a sketch from nature, or from the imagination.

If we place the eye at the station point, and *look* in the direction followed by a system of lines, we shall see their vanishing point (8); and if the picture is supposed to be interposed we shall see the perspective of the vanishing point in the same direction, covering the real vanishing-point. Hence the perspective of the vanishing point of any system of lines is found by passing through the station point an element of that system. The point where it pierces the picture-plane is the perspective of the vanishing point of the system, coinciding with and covering the real vanishing point.

30. As M and M' are equally inclined to the horizontal plane, one looks up towards V^M at exactly the same angle that he looks down towards $V^{M'}$. V^M is accordingly just as far above the Horizon as $V^{M'}$ is below it.

The same is true of V^N and $V^{N'}$. But although M and N make the same angle with the ground, the distance of their vanishing points above the Horizon is not the same. For the eye at S, six inches in front of C, is further from V^L than from V^R, L being less inclined to the plane of the picture than R is. Looking up, then, at the same angle, though the eye sees the real left-hand upper vanishing point at the same height as the right-hand one above the real Horizon, it sees its perspective, V^N, higher up on the paper.

31. In like manner the perspective of the trace of a plane or of a system of planes is found by passing through the station point an element of the system. The line where it intersects the plane of the picture is the perspective of the trace, or horizon, of the system of planes.

For if the eye is at the station point, and glances along the element of the system passing through it, it will see the trace upon the plane of the picture covering and coinciding with the distant trace or horizon.

32. And as the horizon of a system of planes passes through the vanishing points of all the lines that lie in it or are parallel to it, so does the perspective of the horizon, or trace, pass through the perspective of their vanishing points; and as all lines lying in or parallel to the system have their vanishing points in this horizon, so do the perspectives of all such lines have their point of convergence or vanishing point in this trace.

33. The propositions 12 *a*, *b*, *c*, *d*, *e*, are thus as true for the perspectives in the plane of the picture as for the real lines and planes, vanishing points and horizons, as is exemplified over and over again in this plate. All the traces shown pass through several vanishing points, and every vanishing point lies in the trace of some system of planes. Every line which lies in two planes, as most of these lines do, has its vanishing point in both traces, that is, at their intersection; and the traces of all the planes parallel to any one of these lines meet at its vanishing point.

34. It is specially to be noted that the lines of the hips and valleys lying at the intersection of two planes of the roofs have their vanishing points at the intersection of the traces of these planes.

Thus the lines P, P', Q, and Q', being at the intersection, respectively, of RN and LM, RN' and LM', RN and LM', and RN' and LM, we have V^P at the intersection of TRN and TLM.

$V^{P'}$	"	"	TRN' " TLM'.
V^Q	"	"	TRN " TLM'.
$V^{Q'}$	"	"	TRN' " TLM.

V^Q, the vanishing point of Q, is off the paper, being at the intersection of the traces TRN and TLM'; and so in like manner is that of Q' at the intersection of TRN' and TLM.

On most of the roofs the planes LM' and RN', being on the further side, are out of sight. But the roof in the extreme foreground shows all four slopes. It has accordingly been selected for lettering.

35. This plate shows also that if the picture is vertical the trace of a vertical plane, such as LZ or RZ, is a vertical line. For it must pass through the vanishing point, V^z, of the vertical lines that lie in it, and this point is the infinitely distant zenith.

Besides, it is the line in which that plane of the system which passes through the eye intersects the plane of the picture; and as both these planes are vertical their intersection must be vertical.

36. Hence the hips and valleys, PP', which lie in parallel vertical planes, and accordingly have their vanishing points V^P $V^{P'}$ in the trace of the system to which those planes belong, lie in a vertical line, one exactly above the other. As P and P' are equally inclined to the horizontal plane, V^P and $V^{P'}$, as well as V^R and V^M, or V^L and V^N, are equally distant from the Horizon. These relations are indeed sufficiently obvious from the symmetry of the figure.

The vertical trace TPP' is not shown in the plate.

37. The proposition that all lines lying in a plane have their vanishing points somewhere in the trace of that plane receives special illustration in the case of the paths which cross the flat open space beyond the railroad; being level, they have their vanishing points on the horizon, one at V^R, others at V^3 and V^2. The ladder lying on the roof to the right has the vanishing point of its sides, which are supposed to be made parallel, at V^1 in the trace of the plane of the roof, TRN'.

This proposition is very serviceable in putting in any parallel lines on any plane, as, for instance, in drawing the diagonal lines of slating on the roof to the left, the vanishing points being shown at V^4 and V^5 in the trace of LM, the plane of the roof.

38. This plate illustrates also the proposition (12) that in the case of solid objects the plane surfaces by which they are bounded are visible only on the sides towards their traces, or horizons; they are visible only when they are, so to speak, *below* their horizons. We see in the plate that the roof most nearly below the eye, being below all the horizons, shows all its slopes, and so does the next one to the left. In all the others, one, two, or three planes disappear, as they are above their traces; until at last in the case of the church on the top of the hill, which is above all the traces, all the roofs are out of sight. One of the houses in the fort on the lower hill shows the roof LM just disappearing, the lines L and M both coinciding with the horizon TLM.

39. It is to be observed that these traces, being portions of great circles, do not terminate at the vanishing points by which their position is determined, but pass through and beyond them.

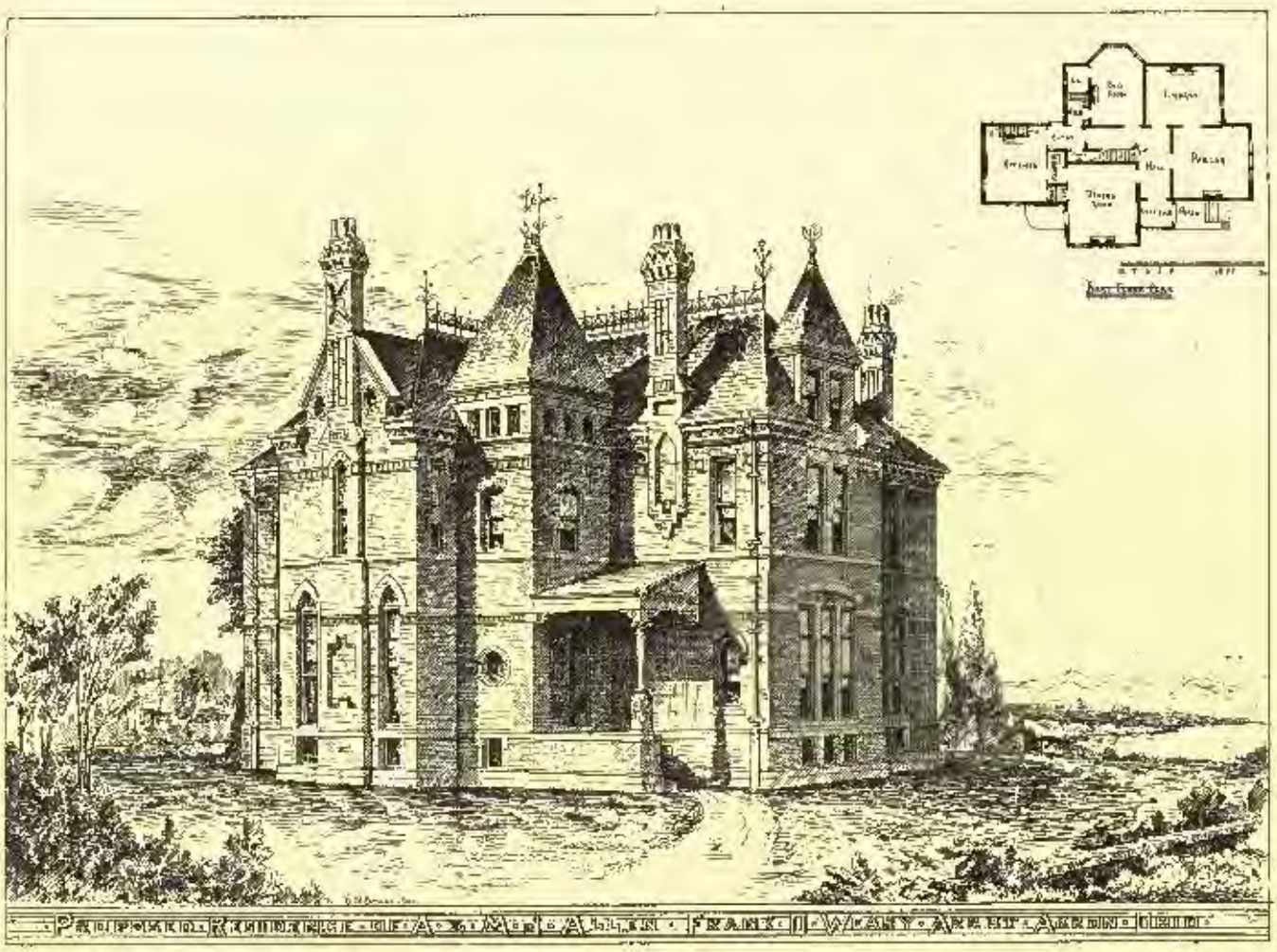
40. The perspective of a line or of a point is often called a perspective line or point, or when speaking of the picture, simply a line or point. But in this last case, to avoid confusion of mind, one must be careful to notice whether the real line or point and the infinitely distant vanishing point are spoken of, or their representations in the plane of the picture.

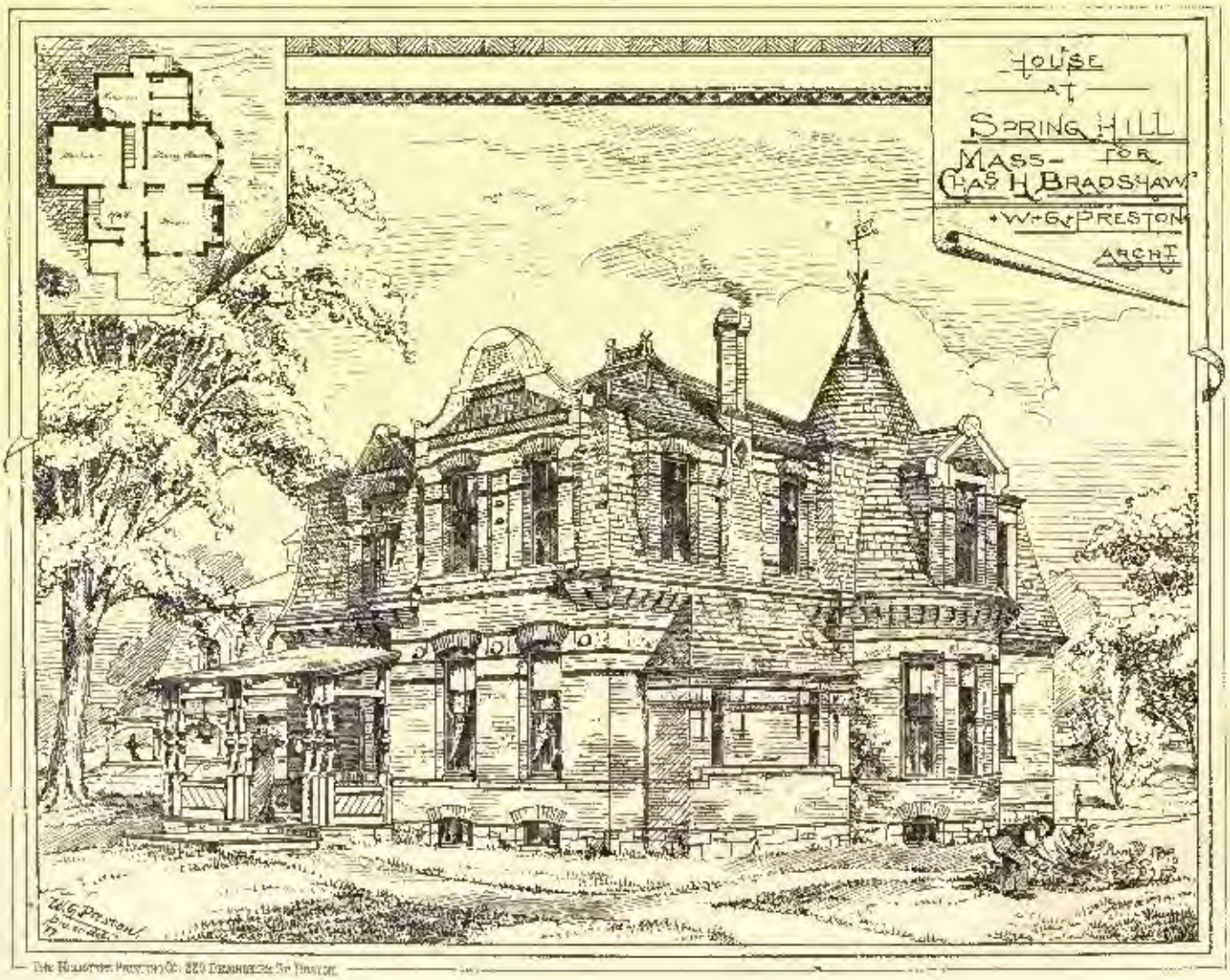
So in speaking of the trace or horizon of a system of planes, one must be careful to notice whether the infinitely distant line, or the line in the picture which covers, and to the eye coincides with it, is intended. It might be well for distinction's sake, to call the former, or distant imaginary line, the horizon of the system of planes; and the latter, or line where the plane passing through the eye cuts the picture, its trace.

THE ILLUSTRATIONS.

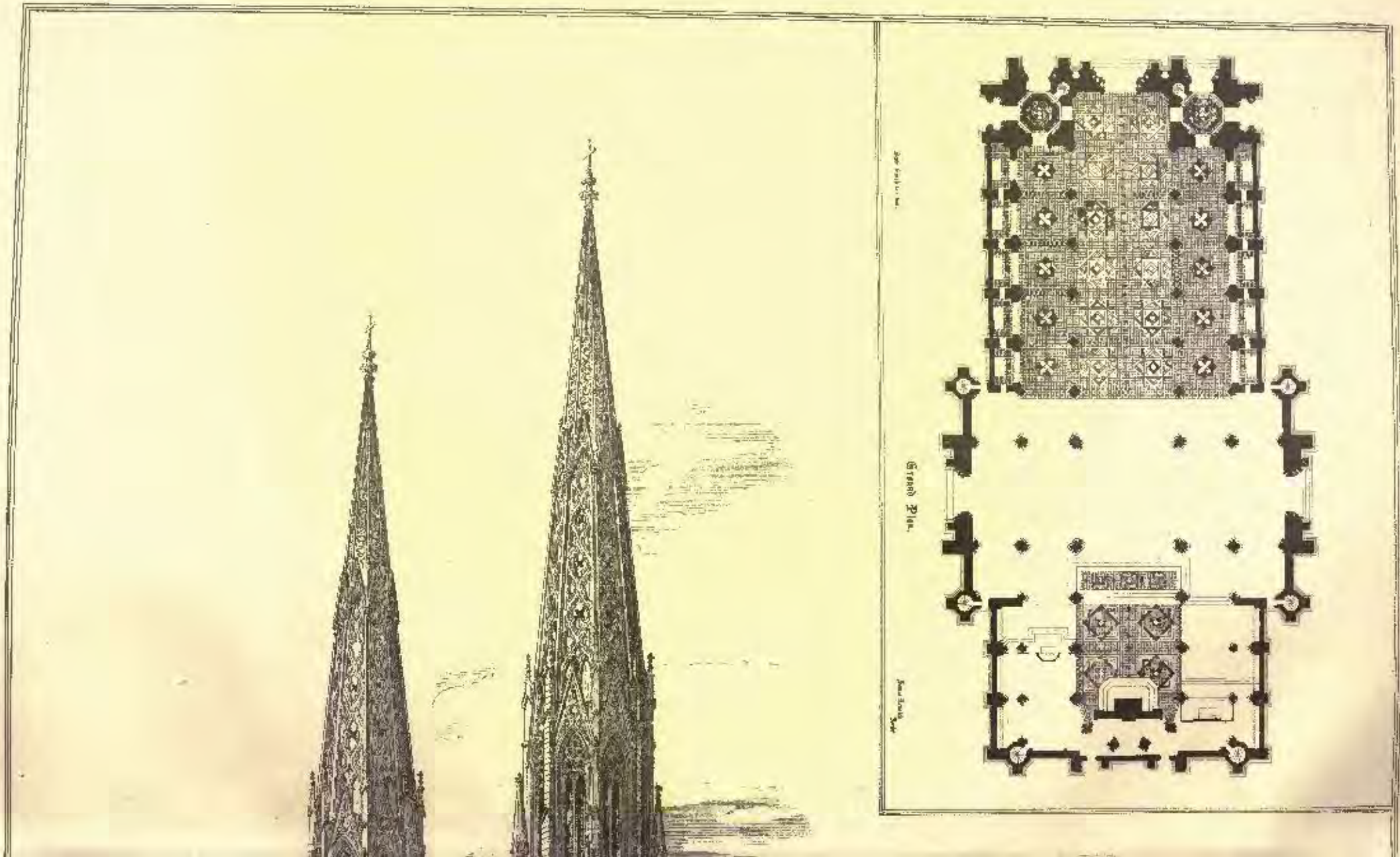
ST. PATRICK'S ROMAN CATHOLIC CATHEDRAL, NEW YORK.

THE corner-stone of St. Patrick's Cathedral, New York, was laid Aug. 15, 1858, by Archbishop Hughes, in the presence of over one hundred thousand persons. It stands on the highest point of Fifth Avenue, below the Park, and occupies the whole block bounded by Fifth and Madison Avenues, Fiftieth and Fifty-first Streets. The site is rocky, the bed-rock extending in some parts up to the surface, and necessitated much blasting. The foundations are in blue gneiss in very large blocks laid in cement mortar;





The Heliotype Printing Co. 220 Devonshire St. Boston.



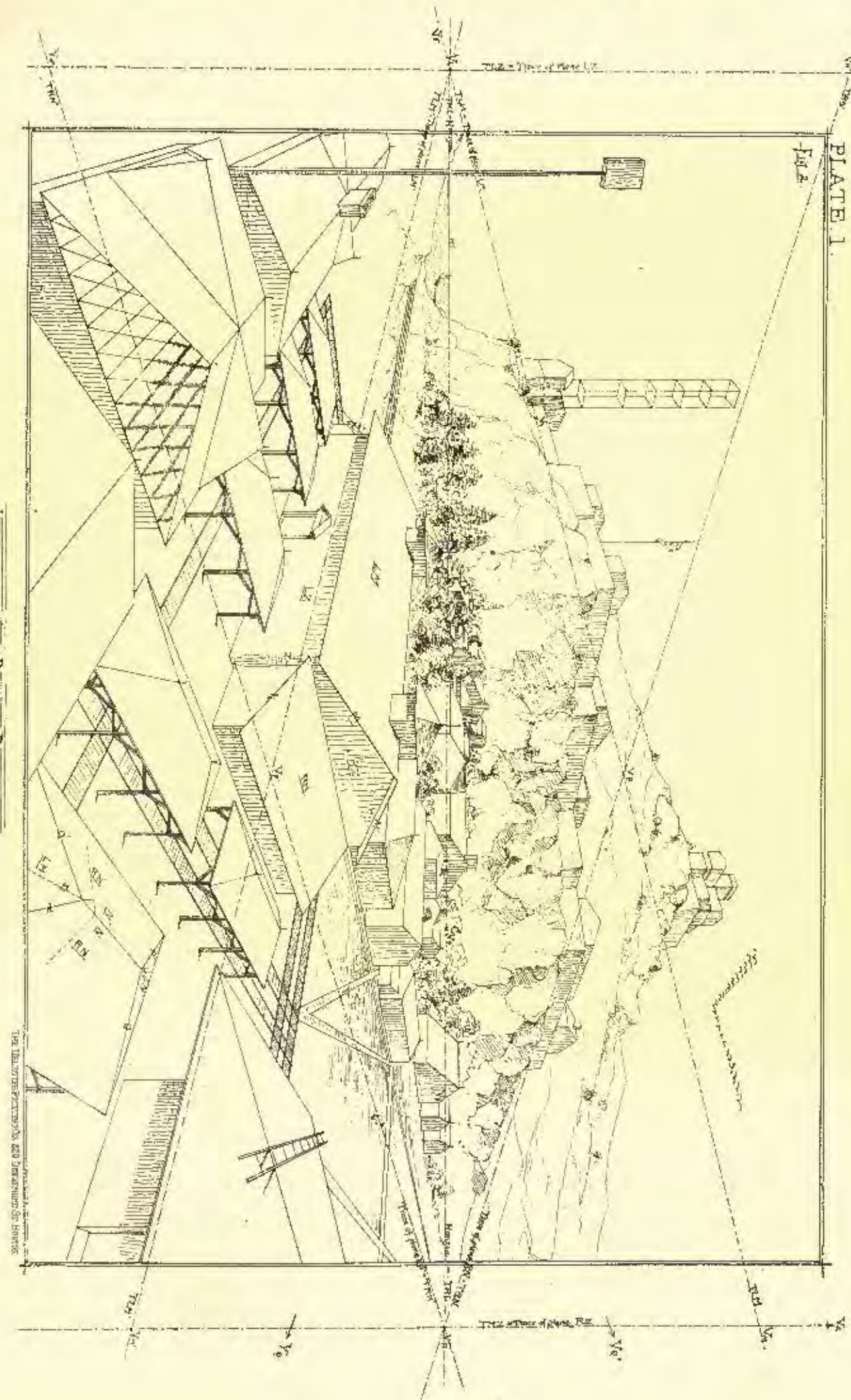
R-C-CATHEDRAL OF NEW-YORK

JAMES KENWICK ARTIST

THE KOLLOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON

PLATE I.

ILLUSTRATION OF PAPER ON PERSPECTIVE.



above the ground-line, the first base course within and without the building is in Dix Island granite; above this the whole exterior is in white marble from quarries at Pleasantville, Westchester County, N.Y., and at Lee, Mass. The walls are built with air-spaces and backed with selected hard brick; and up to this time not a single crack or settlement has been detected. The design is in the decorated or geometric style of Gothic architecture, of which the Cathedrals of Rheims, Amiens, and Cologne and the naves of York Minster, Westminster and Exeter, are examples. The ground-plan is in the form of the Latin cross, with nave, choir or sanctuary, and transepts, the nave and aisles being separated by thirty-two clustered columns in white marble. The general dimensions are: Interior length 306 feet; breadth of nave and choir 90 feet exclusive of the chapels, and 120 feet with these included; length of transept 140 feet, of which the central aisle is 48 feet wide and 108 feet high; width of side aisles 21 feet, and height 54 feet. The ceilings are in plaster, ribbed, with rich bosses of foliage at the intersections of the groins, and the capitals of the nave and clere-story columns are similarly built up in plaster; a triforium gallery is carried around the nave and along the transepts.

The principal front is on Fifth Avenue, and as will be seen is a central gable, with a tower and spire on each side. The gable is 150 feet in height, and the tower-spires each 300 feet. The grand doorway has its jambs richly decorated with columns with foliated capitals. The thickness of the wall here is 12 feet 6 inches, and the whole depth of the doorway is incrusted with marble. It is intended to place the statues of the twelve Apostles in rich tabernacles of white marble in the jambs of the portal. The width of the opening is 30 feet and its height 51 feet; a transom richly decorated with foliated carving crosses it at the spring of the arch, while a traceried window fills the tympanum. The gablet over the main portal is filled with tracery, and has a shield bearing the diocesan arms in the central panel. The label over the gable is crocketed with a running design of interwined grape-vine and morning-glory, with a very beautiful finial. The door is flanked on either side by buttresses which terminate in panelled pinnacles, and between these and the tower buttresses are niches for statues. The horizontal balustrade over the first story is of pierced tracery. Over this and across the face of the whole gable is a row of niches 7 feet 6 inches high, for statues. These niches are very richly decorated with capitals and gables, with tracery and finials, and are to be filled with figures of martyrs. Above this row is the great window, the head of which is filled by a magnificent rose-window 26 feet in diameter, filled with a design in stone tracery. Above this window the main gable is carried up to the roof-lines, and is veiled by a pierced screen of rich tracery terminated by a label-cornice, crocketed. The crockets are designed upon the passion-flower, flowing up and intwining a cross bearing an emblem of the Sacred Heart at the intersection. The towers are 32 feet square at the base exclusive of the buttresses, and maintain the square form for a height of 136 feet, where they change to octagonal lanterns 51 feet high, and then come the spires 140 feet in height. The towers are divided into three stories; in the first are the doorways, corresponding in style with the central doorway, with crocketed gablets, having tracery and shields containing the arms of the United States and of the State of New York, over which are balustrades of pierced tracery. In the second story are windows with tracery and moulded jambs corresponding with the rose-window. The third story will have four small windows on each side, and will be terminated by a label mould, cornice, and pierced battlement. The towers are flanked by massive buttresses which are decorated with tabernacles at each offset, and will be terminated by clustered pinnacles which will join the buttresses of the octagonal lanterns over the towers. The lanterns will have windows with tracery on each side, with gables and tracery over, the whole terminated by cornices and pierced battlements. The spires will be octagonal and will be divided into two stories. The first story will have rich mouldings at the angles, and the faces panelled with traceries. The second story will be moulded and panelled like the first, and end in a rich finial carrying the terminal crosses which will be of copper.

The first stories of the towers serve as vestibules from Fifth Avenue. Circular stone staircases are carried up in the buttresses of the towers to the organ-loft and upper stories of the tower, also to the triforium. A chime of bells will be placed in the third story of the towers, 110 feet above the level of the street. These bells are those which were rung at Machinery Hall at the Centennial Exhibition.

The side aisles of the nave are divided into five bays, each bay pierced by a window 13 feet 6 inches wide, and 27 feet high, which is divided into three parts by mullions and whose tympana are filled in with tracery. The transept fronts are divided into a central portion, 48 feet wide and 170 feet high to the top of the crosses of the gables and two side portions. In the centre of these façades are portals corresponding to those of the front. Over each door is a large window. These two windows are 28 feet wide by 58 feet high, and are divided into six bays. The heads are filled in with rich decorated tracery. A row of niches crosses each transept at the line of the eaves, and above this the gable is richly panelled.

The clere-story which rises 38 feet above the side aisle roofs, and 104 feet above the ground-line to the eaves, is divided into six bays in the nave, and two in either transept; three bays in the sanctuary on either side, and five in the apse, which is a half-decagon in plan. The bays are divided by buttresses which terminate in grand pinnacles rising 30 feet above the eaves; each bay is pierced by a window 14 feet 6 inches by 26 feet high in four bays by ribbed mullions. These windows are surmounted by panelled gables with traceries, and the walls between the gables and pinnacles are finished by pierced battlements. The roofs of the nave and side aisles will be slated, and the nave roof will have a cresting 5 feet 6 inches high, with a finial over the intersection of the nave and transepts 15 feet high; at the east end over the apse will be an ornamental cross 13 feet high.

It had been the intention of the architect, Mr. Renwick, to put in a ceiling of brick vaulting, with stone ribs; and to resist the thrust, flying buttresses had been provided for without. With the putting in of the plaster ceiling, these flying buttresses were omitted, and the pinnacles shown upon the buttress piers were dropped down to the level of the aisle cornice. In looking at the illustration this change must be allowed for. The cathedral has a real triforium, a spacious passage, extending along either side of the nave, and down the transepts as well. Here will be placed the coils of steam-pipe to assist in warming the church by creating an upper stratum of warm air, and preventing any downward draughts of cold air from the clere-story windows. Over the triforium arcades the side walls are built in an artificial stone, harmonizing very well in tint with the real marble-work. The windows throughout will be double glazed, and no small amount of care has been taken to make them the best stained glass windows in this country. The nave clere-story windows are in mosaic, by Morgan Brothers, as is also the great rose-window in the front gable. Some of the finished windows representing the imported work were shown at the Centennial Exhibition, and, from the windows now in place in the cathedral, give promise that when finished the effect will be very rich. The north transept window is by Nicholas Lorin of Chartres, and portrays the life of the Virgin. In the south transept window, the life of St. Patrick is shown in a series of mosaics by Henry Ely of Nantes. The flanking windows in the north transept are St. Augustine and St. Monica (Ely), and Paul at Athens (Lorin). In the south transept, the windows are the Sacred Heart (Ely), and St. Louis with the Crown of Thorns (Lorin). About the apse and choir, the clere-story windows are all by Lorin, and run as follows: South side, 1, Sacrifice of Abraham; 2, Aaron; 3, the New Law. Apsidal windows, 1, Disciples at Emmaus; 2, the Key to Peter; 3, the Resurrection; 4, the Communion; 5, Lazarus. North side, 1, Abel; 2, Noah; 3, Melchisedec. The five windows of the north aisle are, the Three Baptisms (Ely), St. Columba (Lorin), the Christian Brotherhood (Lorin), Martyrdom of St. Lawrence (Lorin), and St. Bernard preaching to the Crusaders (Lorin). North transept, St. Patrick (Lorin), St. Mark (Ely), St. Matthew (Ely). North side of sanctuary, St. Anne (Lorin), Adoration of the Magi (Lorin), and one vacancy. The five windows of the south aisle are, starting from the front, St. Vincent de Paul (Ely), St. Elizabeth, St. Andrew, and St. Catherine (Lorin), The Annunciation (Lorin), St. Henry (Lorin), Proclamation of the Immaculate Conception (Lorin). South transept, St. Charles Borromeo (Ely), St. Luke (Ely), St. John (Ely). South side of sanctuary, St. Agnes, St. James, and St. Thomas (Ely), and two vacancies. All these windows are the gifts of either individuals, corporations, or dioceses.

The high altar will be placed on the chord line of the apse, about twelve feet from the easterly end of the building. The table of the altar is of white marble, and is divided into niches and panels on the face, the niches filled with figures, and the panels with bas-reliefs of the Saviour's life. The tabernacle over the altar will be of marble, decorated with Roman mosaics and precious stones, and will have a door of gilt bronze. The base of the reredos behind the altar will be of white marble nine feet high, with moulded bases of colored marble, and the whole front is laid with a diaper-work of alabaster. The screen above has a central tower with colored columns, tabernacles, statues, and rich foliage, above which rises a pierced spire of open tracery, surmounted by a gilt cross. The two flanks have niches with colored columns and gablets, with statues of St. Peter and St. Paul in them; over these the side towers are also crowned with pierced spires of open tracery work. The spaces between the central and two corner towers are divided into six niches, containing angel figures, bearing shields with emblems of the Saviour's passion, and terminating in pierced gablets. The total height of the reredos is fifty feet, and the work upon it is now completed at Rome, Italy, and at St. Brieuc in France. Its entire cost will be $35,000. The bishop's throne is also of marble, with a tabernacle of the same material, and is a most careful piece of carving.

The general effect on entering the nave from the main entrance is very striking, the height to the ceiling being particularly noticeable. The double line of windows in the apse looks rather broken. The floor will be laid in tesselated work; and though it was at first intended to avoid the cumbering of the interior with pews, it has lately been decided to fit up such sittings in ash. The space between the main buttresses on the outside has been used

for confessional alcoves, opening into the aisles beneath each aisle-window, five on each side the church. How many millions will be spent on the structure before its completion, it is almost impossible to say; nor would it be at all safe to fix the date of completion. An arch-episcopal residence and a number of other buildings are to be built in connection with it; but on these no work has yet been done. Since 1853, when the first sketches for the structure were made, the work has gone on faster or slower, as the funds in hand permitted.

HOUSE FOR CHARLES H. BRADSHAW, ESQ., SPRING HILL, MASS.
MR. W. G. PRESTON, ARCHITECT.

PROPOSED RESIDENCE OF MESSRS. A. AND M. J. ALLEN, AKRON, O.
MR. F. O. WEARY, ARCHITECT.

PERSPECTIVE STUDY, — NO. I.

For explanation of this cut, see the preceding article, "Papers on Perspective."

THE POSSIBILITY OF A NEW STYLE IN ARCHITECTURE.

[A paper by Mr. A. F. Oakey, A. I. A., read at the Eleventh Annual Convention of the American Institute of Architects.]

So many eminent authors have written on this subject, that it would seem little remains to be said; and yet I think that a careful comparison of the views of the best authors naturally suggests a conclusion that I find, whether intentionally or not, omitted, or rather not developed, in any of them.

Mr. Fergusson says that a new style is to be found in a development of the Italian Renaissance, that no progress is possible in Gothic or Greek, and further, that archæology is not architecture; while Mr. Garbett, condemning the servile copyist, as strongly points to the possibility of a new style in the one constructive principle that has never yet controlled a style, i. e. "*the Tensile.*" He believes that the *Depressile* and the *Compressile* have been exhausted, and that a system embodying "*the Tensile*," together with a generalized imitation of nature, is the goal we seek. Guillaume agrees with Fergusson in the main, but looks for no change till architects are guided by science more than tradition.

Much has been written by other distinguished professors, but in these three we have the sense of the discussion in its latest stage. I have looked in vain in the works of these authors, and in those of many others, for a statement or suggestion of a theory whose apparently unconscious corroboration has been, in Mr. Fergusson's case at least, the work of his life. I cannot read his history without being struck with the completeness of the evolution its pages record: there is no missing link in this work of nature; for I must believe architecture, as an expression of the longings and aspirations of physical and intellectual man, the work of nature as actually as any thing Mr. Huxley can enlighten us upon.

Until the fifteenth century, neither the whims of this or that architect or client, nor the accumulated traditional pedantry of either or both, could avail against the natural growth of forms born of bodily needs or religious superstition. The changes that were made from time to time, owing to climatical influences, or as the result of political or religious revolution, were as naturally consequent as the changes in the structure and exuberance of a vegetable when transplanted, or by treatment brought to a high state of cultivation. The cultivation must be in the right direction, the inherent and essential qualities of the plant must be cultivated, or the species dies out, and we have nothing left but the chromo in the book to record how beautiful a flower it once bore.

Why do we need now what the world never desired before? Why are we divided to-day between the revivalists and the novelty-hunters? and this last occupation the lowest incentive to architectural — I might say all — effort. On the one hand, are we to accept the conclusions of the fifteenth century as final in architecture more than in astronomy? and on the other, is there not an inherent fitness in things in form, consistency, and expression, that absolves us from any responsibility as to their age or novelty?

The answers to these questions are not in favor of tin gargoyles, or in fact constructive lies of any kind. As Sir Joshua Reynolds says: "The natural appetite of the human mind is for truth, whether that truth results from the real agreement or equality of original ideas among themselves, or of the representation of any object with the thing represented, or from the correspondence of the several parts of any arrangement with each other. It is the very same taste which relishes a demonstration in geometry, that is pleased with the resemblance of a picture to an original, and touched with the harmony of music." And again, what he says of other arts could well include architecture: "On the whole, it seems to me that there is but one presiding principle which regulates and gives stability to any art. The works, whether of poets, painters, moralists, or historians, which are built upon general nature, live forever; while those which depend for existence on particular customs and habits, a partial view of nature, or the fluctuation of fashion, can only be coeval with that which first raised them from obscurity."

In what I have quoted, has not Sir Joshua said enough to cover the whole field of art? and yet we continue to this day to waste our clients' money in tessellated towers and the like conceits, as if we expected to be undermined by our neighbors, and to be consistent with which scenic representations, we should go masquerading in shapes with chain-armor under our doublets.

To offset these archæological reversions we have the provincial builder with his jig-saw and his balloon frame; and we find ourselves admiring the progress of the engineer as the only worker in the field who has thought for himself, accepted the limitations of his problems, and met them with ingenuity: only his lack of artistic training enables us to find a living in our practice, unless we are content only to be called upon to minister to the unnecessary and luxurious evidences of civilizations, and to take no part in the development that will go on, whether we move with it or not.

It seems to me that Mr. Garbett is nearer the truth with his development of the Tensile system, than Mr. Fergusson with his Italian Renaissance; for this principle already shows its influence strongly in all our utilitarian work, — i.e., work in which the requirements must be met without regard to expression; and does not the expression follow inevitably?

Why should we discard the "*Depressile*" and "*Compressile*," simply because there is little room for invention in their application? Ought we not rather be glad that the earth's surface abounds with the truest examples to guide us in our work? It is no argument against a composite system of construction, that we have no precedents; we are in no sense bound to adhere to the peculiarities of any age.

The question must always be one of the best means to an end; and if the end is reached the means excuse themselves, especially as they are so bound up in it as to make it impossible to achieve a satisfactory result with insufficient means. Why have we not the courage to think for ourselves, and, when we are asked in what style have we expressed our thoughts, to answer that we do not think it necessary to classify and ticket every thing, to name in one word an ever-varying system that eludes such an attempt?

The Eastlake style, forsooth, is even now a recognized term; and yet it would puzzle the quill-drivers, or any one else, to say in what it consists. I like the old English definition of architecture: "the art of well building;" and what is not well and truly built does not deserve the name. This, it seems to me, is all with which we have to concern ourselves, to study each problem by itself; and, having met the requirements in plan, as we build up upon it, who shall hold us responsible for our style, if every purpose that was intended is served by ingenious, constructive economy?

I do not wish to inveigh against suitable and necessary decoration, — necessary as regards the phonetic expression of a design; but I can see no reason for reviving the mediæval, grotesque, or shutting fair daylight out of a building where light is a desideratum, because we have precedents for these dispositions. And there's the rub: Have we precedents for any such thing? No more than we have precedents for stone spires made of wood. If there is one fact connected with the examples we blindly imitate, it is that they were built for purposes which they fulfilled; and there is ample internal evidence that their designers would have treated our problems in an entirely different way.

Because our ancestors were fortunate enough to unearth the classic poets, and unfortunate enough to consider it necessary to revert in every thing to the classic type, we have been obliged to go all over that old ground; and it is not our fault if we have not repeated every vagary of every decline until we find ourselves where we started. Now that it has taken all these centuries to find the road we have strayed from, are we going to wander round the monuments of past ages, rhapsodizing this or that detail that has lost its significance in our day, ignoring the great principles that could lead us on, and mumbling about a new style? No man or whole professional brotherhood can saddle the world with what it does not need to satisfy its utilitarian ends or its religious thought; and it is worse than idle to grumble at the sway of the mighty dollar, to give as an excuse for constructive lies, the reason that the money was not forthcoming to pay for a real stone vault or flying-buttress. If the stone vault had been necessary, the money would have been forthcoming. The mighty dollar is the power of our age, and a power that places every process and every material within our reach if we would only avail ourselves of our opportunities.

The underlying principles that enabled the mediæval architects to command our admiration and respect are as true to-day as they were then, and it is only by their application to our needs that we can achieve as grand results as ever expressed by the political or religious civilization of any people; while we have the incentive of making our achievements forever stepping-stones for future generations in search — not of a new style, but of truth.

CAST-IRON GLAZED TILES. — The *Deutsche Allgemeine Zeitung* says, At the iron-works of Gneditz, near Riesa, Germany, glazed cast-iron tiles for roofing are now made. They are not heavier than ordinary tiles, and are very strong. The railroad depots of Loebau and of Reichenbach, and many private houses of Hamburg and Dresden, are roofed with them.

A MUCH-NEEDED TECHNICAL JOURNAL.

EVERY one who is interested in sanitary matters, and there are few who are not, will rejoice that a prospect is now open to them of being able to learn something of the experience of others in matters of plumbing and drainage, which shall be applicable to our own climate and circumstances, without undertaking the costly private experiments by which most of us have learned the difficulties of adapting to this region the sanitary systems and apparatus so enticingly described in the English books, which have been hitherto almost our only text-books.

To take a single example: how many American architects have read with joy the descriptions of the Jennings water-closet, thinking that at last the specific for their troubles in that department was found, and hastened to include it in their next plumbing specification; how many have stood by in dismay when the work was done, to see the water of its own accord alternately fill the bowl and siphon out, two gallons at a time, until the tank was exhausted? What consolation to be told by the plumber that they "always did so;" and when we humbly inquired of his superior experience what he considered the best thing of the kind, to hear that nothing had yet been invented so good as the familiar old abomination?

The plumber was wrong, as we should have learned on a second trial; but the most enthusiastic architect gets shy of experimenting either with his own or other people's money.

Now, however, in the pages of a neat sixteen-page monthly journal[1] we are to have an opportunity of relating our own mishaps, and learning wisdom from those of others, as well as of receiving instruction, not only from the best authorities in theoretical sanitary science, but from practical plumbers and gas-fitters, in branches of house construction which are at once so difficult and so important to understand as plumbing and pipe-fitting.

The first numbers are so good that it makes us anxious, thinking that the succeeding ones cannot possibly be equal to the first. We have the beginning of a series of scientific papers by Col. George E. Waring, jun.; a short article on bath-boilers, which contains in a column more information on that mysterious subject than can be gleaned from hundreds of pages of ordinary books on sanitary science; and a sensible communication on that hardly less mysterious subject, gas-fitting; while a few but important lines on damaged waste-pipes throw a flood of light on the murderous work which has been going on in some of our Boston houses. It has a refreshingly practical sound to hear, after learning that the cracked and leaky waste-pipes rejected at the foundries have been extensively sold and put up in houses, that "if any of our Boston friends will take trouble to look through some of the speculation houses built in the South End and out Roxbury way, they may find a mile or so of this pipe," cemented over, and with traps, etc., all in good style for contract work. The editor remarks that most of the builders and plumbers concerned in such work have failed, but "very few," he fears, "have got into prison." He thinks the plumbers may inquire why he betrays their professional weaknesses, and replies that he wishes to show the public why it costs more to do honest work than bad.

We can give him a better excuse still, — the interest of humanity; and will add from our own knowledge, by way of commentary, that in one of these houses *six persons* died of zymotic disease, within one year.

If such frankness would only last!

The managers promise not to sell their opinions or their columns; but in these days of artful advertising the editor of such a paper must be a clear-headed and courageous man not to be entrapped or frightened away from his purpose, and it seems to us that his best friends ought to be the architects. They alone can speak with perfect impartiality of the sanitary experiments with which they have been concerned; they have the best and most varied opportunities for observing; and they are more interested than any others in learning the whole truth about the matters on which he proposes to furnish them information. Let him keep steadily in view his purpose of careful, accurate statement and fearless warning; and let us help him by such encouragement and criticism as we may, availing ourselves of his courtesy to share freely our own experience with others, and remembering that innocent lives depend upon the faithfulness with which we give and receive instruction in these matters, intrusted as they are by most clients, absolutely to our care.

[1] *The Plumber and Sanitary Engineer*, published monthly at $1.50 per year by the American Plumber Publishing Company, No. 29 Pearl Street, New York.

MR. GOLDWIN SMITH ON AMERICAN ARCHITECTURE.

MR. GOLDWIN SMITH lately presented the prizes to the students of the Oxford School of Science and Art. He delivered an address, in the course of which he said:—

"America is supposed to be given over to ugliness. There are a good many ugly things there; and the ugliest are the most pretentious. As it is in society, so it is in architecture: America is best when she is content to be herself. An American city, with its spacious streets, all planted with avenues of trees, its blocks of buildings, far from unimpeachable probably in detail, yet stately in the mass, its wide-spreading suburbs, where each artisan has his neat-looking house in his own plat of ground, with plenty of air and light and foliage, its countless church-towers and spires, not architecturally good but varying the outline, might not please a painter's eye; but it fills your mind with a sense of well-rewarded industry, comfort, and even opulence, shared by the toiling many, — a prosperous, law-loving, cheerful, and pious life. I cannot help fancying that Turner, whose genius got to the soul of every thing, would have made something even of an American city. The cities of the Middle Ages were picturesquely huddled within walls, for protection from the violence of the feudal era; the cities of the New World spread wide in the security of an age of law and a continent of peace. At Cleveland in Ohio there is a great street, called Euclid Avenue, lined with villas, each standing in its own grounds, and separated from each other and from the street only by a light iron fencing, instead of the high wall with which the true Briton shuts out his detested kind. The villas are not vast, or suggestive of overgrown plutocracy: they are suggestive of moderate wealth, pleasant summers, cheerful winters, and domestic happiness. I hardly think you would consider Euclid Avenue revolting. I say it with the diffidence of conscious ignorance; but I should not be much afraid to show you one or two buildings that our Professor of Architecture at Cornell University, Mr. Babcock, has put up for us over Cayuga Lake, on a site which you would certainly admit to be magnificent. If I could have ventured on any recommendation concerning art, I should have pleaded before the Commission for a professorship of architecture here. It might endow us with some forms of beauty; it might at all events endow us with rules for building a room in which you can be heard, one in which you can breathe, and a chimney which would not smoke. I said that in America the most pretentious buildings were the worst. Another source of failure in buildings, in dress, and not in these alone, is servile imitation of Europe. In Northern America the summer is tropical, the winter is arctic. A house ought to be regular and compact in shape, so as to be easily warmed from the centre, with a roof of simple construction, high-pitched to prevent the snow from lodging, and large eaves to throw it off — this for the arctic winter; for the tropical summer you want ample verandas, which, in fact, are the summer sitting-rooms. An American house built in this way is capable at least of the beauty which belongs to fitness. But as you see Parisian dresses under an alien sky, so you see Italian villas with excrescences which no stove can warm, and Tudor mansions with gables which hold all the snow. It is needless to say what is the result when the New World undertakes to reproduce not only the architecture of the Old World, but that of classical Greece and Rome, or that of the Middle Ages. Jefferson, who was a classical republican, taught a number of his fellow-citizens to build their houses like Doric temples; and you may imagine what a Doric temple freely adapted to domestic purposes must be." — *The Architect.*

CIRCULAR TO OFFICERS OF THE TREASURY DEPARTMENT.

1877, *Department No.* 146, *Secretary's Office.*

TREASURY DEPARTMENT, WASHINGTON, D.C., Dec. 31, 1877.

THE following is based upon decision of the Supreme Court in the case of Hawkins *vs.* United States (No. 700 October term, 1877); and publication is made for the information and guidance of officers in charge of public works, etc., under control of this Department, and all parties having, or seeking to have, dealings with the Department through such officers.

I. When a service of a better or a higher grade than that required by contract is rendered upon the demand of a public agent, such demand being made upon an interpretation of the contract, the contractor can have no claim against the United States. Nor will notice given at the time to an unauthorized agent, of an intention to present a claim for additional allowance on account of such better service, change the rule.

II. When a contractor holds himself not bound to a performance which is sought to be required of him, he will immediately state his objections in writing to the agent in charge, who will forward it at once to the Department, with his report thereon, that the question may be decided by the proper authority.

III. Claims for compensation on account of materials or services will not be considered unless they are founded in some agreement; and, when the agreement is claimed to have been entered into by an agent for or on behalf of the United States, it must be shown that he had authority to make such agreement.

IV. Verbal agreements between the parties to a written contract, made before or at the time of execution of the contract, are in general inadmissible to vary its terms or affect its construction; the rule being, that all such verbal agreements are to be considered as merged in the written instrument. Written contracts must therefore be held to express the intention of the parties at the time of contracting; and their plain and reasonable construction cannot be diminished or enlarged by verbal testimony in explanation of such intention.

Neither can an implied promise exist with reference to any subject matter that is embraced in an express agreement.

JOHN SHERMAN, *Secretary.*

NOTES AND CLIPPINGS.

The Providence Building Law.—Mayor Doyle, in his Thirteenth Inaugural Address, says, "A bill was drawn with great care by the Rhode Island Chapter of the American Institute of Architects, which received a thorough examination by a committee of the city council, and a long and careful revision by the most experienced master-builders of this city, and, after being amended in many particulars, was approved by the city council in April last, and is now pending before the General Assembly. The safety of life and property demands the enactment of this law, or the experience of Portland, Chicago, Boston, and other cities, will be repeated here. The rapidity with which the brick and iron buildings were destroyed at the above fires gave the citizens an opportunity to comprehend how an extensive conflagration can occur in a business-district where the buildings are of substantial character. When such structures are well on fire, their destruction is certain; for even the most powerful streams from steamers are only of use in protecting the adjacent buildings: and when these are of great height, and only separated from the one on fire by a narrow street, the firemen cannot stay the progress of the flames, on account of the great heat, and the danger to which they are exposed by the falling walls. It is to be hoped that the approaching session of the General Assembly will not close without furnishing the city with authority to say in what manner buildings shall be constructed within the limits of this municipality."

Explosion in a Sulphur-Factory.—An explosion occurred at half-past six o'clock, Jan. 11, in the sulphur-factory of D. H. Gray, on Ninth Street, Brooklyn. The force of the explosion blew out the side of the building, causing a loss of about $600. It was reported that the boiler had exploded; but there is no boiler in the place: hence the explosion must have been caused by the confined vapor of some chemical used in the factory.

Moving a Brick House.—In many of our interior towns and cities it is a common occurrence to move houses from one place to another; but in Philadelphia such a feat is so rarely attempted, that the one now in progress is worthy of mention. At the corner of Hart Lane and Frankford Avenue there is now being removed, by means of screw-jacks, a distance of 90 feet,—30 feet one way and 60 another,—a three-story brick house, 25 feet front and 74 feet deep, which weighs some five hundred tons. The property is owned by Mr. John Ely, who placed the job in the hands of Mr. James P. Davis. The placing this heavy weight on the timbers on which it slides was hazardous; but it was successfully done, not even a crack making its appearance in the whole building. Ten jacks are used to propel the structure. Three sets of heavy timbers are used; for, as it is moved first easterly and then westerly, all the timbers have to be braced, so that there may be no slipping from their positions. The building is now almost in its new position, and about one week has been occupied in moving it to where it now rests.

Accident in a Clock-Tower.—A clock-weight in the tower of the Congregational Church in East Weymouth, Mass., weighing 450 pounds, fell from its position recently, and passing down through the gallery-ceiling, a distance of 20 feet, lodged on the floor in the rear of the church-organ. Fortunately its passage was obstructed by a heavy cable which had been placed under it as a precaution, else it would have caused greater damage.

The Morton Memorial.—Mr. Larkin G. Meade's design for the Indiana memorial to ex-Senator Morton is a marble monument crowned by a colossal statue of Liberty, with a profile of Gov. Morton on the shaft, and a panel near the base, representing him sending troops to the war.

Street-Sweeping.—A report lately presented to the Municipal Reform Association of New York contained the following statements:—

"In London, with 1,410½ miles of pavement, every principal street is swept once in twenty-four hours, secondary streets three times a week, all others at least twice. In Liverpool, with 235 miles of pavement, like regulations are enforced. In Manchester, with 500 miles of pavement, the principal streets, roads, and thoroughfares, together with the markets, are cleansed every day, secondary streets thrice a week, all others twice. In Boston, with 70 miles of pavement and 230 miles of MacAdam, the principal streets are swept every morning before eight o'clock, all others twice a week, the MacAdam once a week, and all gutters flushed and cleansed weekly. In Philadelphia, with 600 miles of pavement, the principal thoroughfares are cleaned six times a week, secondary streets three times a week, and the whole city is thoroughly cleaned once a week. In New York, with 250 miles of pavement, the authorities claim to sweep her principal streets three times a week, and her other streets once a week. If the claim were well founded, she takes rank below every other important city above mentioned. How is it, then, when every citizen knows that the claim is baseless, and without shadow of right?"

Plumbers as Witnesses and Jurors.—Some eccentric person is circulating in Washington a petition to Congress to have plumbers excluded from the witness-stand and jury-box in the District of Columbia.

An Ingenious Water-Faucet.—A Californian is said to have invented an ingenious water-faucet, through which, if water is run, it comes out as cold as ice-water. Boiling water placed in any receptacle, and allowed to run through, will be found cool and fit to drink. The faucet contains numerous small tubes enclosed in large ones; and between the outside of one and the inside of the other certain chemicals are packed, which produce the desired effect. The inventor declines to give further particulars.

The Durability of Zinc.—It is stated that a portion of the cloisters of Canterbury Cathedral is roofed with zinc which after thirty-three years exposure to the weather has been pronounced by the architect to be in good condition.

Cleopatra's Needle.—The litigation as to salvage for towing the Egyptian monolith into Ferrol, the Spanish port, has been so far settled as to allow another attempt to bring it to England to be made. Mr. Dixon writes to the London bureau of the New York *Herald*, "We purpose attempting to tow the Cleopatra to England about the 10th inst., as we shall then have a good moon. Our tug is overhauled, and, as it is projected, will leave about the 8th. Your weather prophecies from the United States have been so correct, that I shall venture to ask you about that time to telegraph immediately to my captain at Ferrol any news of probable weather that you may receive from the *Herald*. And, if you mention the matter pointedly to your Weather Bureau in New York, it might excite their interest in this undertaking, and induce them to give special attention to the weather in the Bay of Biscay."

M. Gramme.—M. Gramme, inventor of the machine for continuous magneto-electric currents, has received the Cross of the Legion of Honor. He was formerly, it is said, a working cabinet-maker.

How the Danube feeds the Aach.—Some time ago a dispute arose between the German Government and certain manufacturers on the River Aach, which involved the determining the source of the river which has its immediate source in a spring, one of the largest in Europe, as it discharges about 1,350 gallons a second. The bed of the Danube is calcareous, and its inclination is the same as that of the ground from the Danube to the source of the Aach, which is at a level eight hundred feet below. For a number of years it had been noticed that at a certain place the Danube lost a portion of its waters through holes and crevices in its bed: this loss was so great that in times of drought it caused great inconvenience to manufacturers on the Danube, who attempted to prevent it by filling up these holes. This caused a great outcry from the manufacturers on the Aach, who maintained that the Aach was fed by the Danube, and that filling up the holes was an interference with their just and natural privileges. Hence investigations and experiments. First, twenty tons of salt were put into a hole in the bed of the Danube, and the water at the source of the Aach was analyzed for several days, and did give evidence of containing salt. To obtain more certain proof, advantage was taken of the wonderful coloring power of fluorescine, which is the first of a series of superb coloring substances, which vary as there is introduced into its composition bromine, iodine, or chlorine. Its power may be judged from the fact that one part of fluorescine to twenty million parts of water can be detected. In this experiment fifteen gallons of a solution of fluorescine were thrown into the Danube at the suspected point, on Oct. 9, at five o'clock. On Oct. 12, sixty hours after the solution had been thrown into the Danube, the watchers at the source of the Aach noticed the first discoloration of the water: this discoloration increased until the evening, and did not wholly disappear for more than twenty-four hours. It is said that when the discoloration was most marked, the water gushing from the spring presented a truly magnificent appearance, varying in color from the most intense green through light green to a brilliant yellow. This test established the fact that the mill-owners upon the Aach were in the right.

Hard-Wood Floors.—The renovation of parquetry, or floors of inlaid wood of any kind, can be well effected by the following simple means: The floor is first washed, by means of a mop, with a caustic soda solution, which has been prepared by boiling one part each of slaked lime and dry carbonate of soda (soda ash), with fifteen parts of water, for forty-five minutes. After it has stood a short time, the dirt and old wax should be thoroughly removed by scrubbing with sand and water and a stiff brush. The floor is again washed with sulphuric acid, diluted with eight parts of water. This restores its original color to the wood by penetrating its pores, and combining with the particles of dust and wax not reached by the soda solution. After being perfectly dried, the restored surface is waxed and polished anew.

Adventures of an Inscription.—There was an old house in Brighton which for many years had a Latin inscription in raised Roman letters, which, in consequence of the action of the weather, underwent a variety of vicissitudes. First the inscription seems to have been, *Excitat acta robur* (Strength awakes action). This became changed to *Excitas actis robur* (Thou awakenest strength by deeds). Again this became changed to *Excitat actis robur* (He rouses to strength by acts). Again came another change, *Excitas acta robur*. (Thou awakest to deeds of action, O strength!) But its last appearance defied all efforts at translation, *Excitus acta repat*; and as it only excited ridicule, it was entirely obliterated.—*Leisure Hour*.

The Gilding of the Present Day.—The "gold" gilding so profusely used for ornamental purposes at the present day is said to be silver-leaf, turned yellow and golden by the application of a shellac. The discovery of the process is accredited to a German tinsmith, who, while soldering a saucepan, accidentally dropped upon the metal some of the resin he had been using. This changed the bright tin to a sort of dead yellow, resembling gold. The development of the observation which this humble workman made years ago is the gilding process of to-day.

To make Modelling-Clay.—Knead dry clay with glycerine instead of water, and a mass is obtained which continues moist and plastic for a length of time. This removes one of the greatest inconveniences that is experienced by the modeller.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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THE case of Hunt *vs.* Stevens, just decided in the New York Superior Court, has attracted a good deal of attention. Mr. R. M. Hunt, architect, had built some time ago an apartment house—the Stevens House, at the corner of Fifth Avenue and Twenty-seventh Street—for the late Mr. Paran Stevens. Later, under the orders of Mrs. Stevens, an addition to this house had been built on Fifth Avenue, by Mr. Arthur Gilman, architect. Mr. Gilman had thought it necessary to drive piles for his foundation, and had used the party-wall against Mr. Hunt's part of the building to support his floors. After the building of Mr. Gilman's addition serious dilapidations appeared in the front of Mr. Hunt's building, owing chiefly to settlement at its junction with the addition,—dilapidations which it cost, as was said, a good many thousand dollars to repair. Mr. Stevens, who was on his death-bed when the building was finished, left unpaid one-third of Mr. Hunt's fee, amounting to five thousand dollars. This his executors refused to pay, and Mr. Hunt's suit was to recover it from Mrs. Stevens. The defendant maintained that the commission was not due, because the dilapidation of the building was caused by the plaintiff's negligence in not securing proper material and workmanship; that the water-pipes in the building were badly arranged and had to be replaced, that his plans were faulty and his construction insecure, and that the main arches in the front of the building had failed in consequence of bad construction, for which the plaintiff was responsible.

IT was shown on the trial that Mr. Stevens had driven a close bargain with his architect, and had made a contract with him to furnish drawings and specifications with a general oversight of the building for three per cent on an estimated cost of half a million dollars (whereas the building really cost eight hundred thousand); and to save money had given the actual superintendence to a man chosen and paid by himself. The plaintiff contended that this arrangement relieved him from responsibility for the way in which the work was carried out, and that the faults in workmanship and material were due to deviations from his plans ordered by Mr. Stevens, and to the neglect of his superintendent or to the failure of men with whom he had independently contracted. It was further argued that driving piles for the new part of the building, and loading the party-wall with additional floors, had led to the settlement which injured the old part. A good deal of expert testimony more or less conflicting was brought in as to the injury likely to be done by piling close to walls already built, the quality of work and material in the building, and the adequacy of Mr. Hunt's plans; but it was clearly shown that Mr. Stevens had interfered seriously with his architect's intentions, insisting on his trusting to the old foundation of the party-wall instead of building an independent pier on concrete foundation at the end of his façade, or underpinning the old wall, as he had proposed; that he had himself prescribed the objectionable arrangement of water-pipes; and that when a crack showed itself in the façade, he countermanded Mr. Hunt's proposition to return to his first intention and put in a concrete foundation. The judge (Judge Sanford) charged that unless the architect could show that he had performed his part of his contract properly, the defendant was entitled to a verdict and an award of damages for the failure of the building, and that if it appeared that the arches of the building failed from faults of the design, or from deviations allowed by the architect, he had not fulfilled his contract; whereas, if they failed from bad workmanship or material, and neglect of Mr. Stevens's superintendent, the architect was not responsible. The jury were out but ten minutes, and brought in a verdict for the plaintiff to the full amount of his claim, with interest.

THIS building appears to have been fruitful in litigation; for it is but a few months since the architect of the addition, Mr. Gilman, brought a suit against Mrs. Stevens for the unpaid balance of his fees. In this case the defendant made the same charge of neglect in superintendence, and brought in a counter claim, for twenty thousand dollars by which, it was argued, the value of the building had suffered in consequence of such neglect. The architect's claim was not only for an unpaid balance ($832) of commission on the building in question, but also for a commission of two and a half per cent of the estimated cost of another, for which he had made plans, but which had not been built, the whole claim being some ten thousand dollars. The court ruled that an architect was liable for inferiority in labor or material to that required by his specification for work done under his superintendence, provided it could be shown that he neglected to use such care and diligence in supervision as is commonly rendered by men in his profession; but not unless such neglect could be shown; and the jury was charged to decide whether it had been shown. The validity of the claim for the unbuilt house turned on the question whether the plans and specifications were furnished at the request and for the advantage of the defendant. The court ruled that two and one-half per cent was the established fee for such services, the schedule of fees prepared by the Institute being offered in evidence, and accepted as the record of the existing usage in the profession. The jury was charged to decide whether the architect had neglected to use due, that is ordinary, care in superintendence, whether the plans for the unbuilt house had been furnished at the desire of the defendant, and to offset the damages due the defendant, if any, against the claim of the plaintiff. The verdict was for three thousand dollars in favor of the plaintiff. It would be interesting to know, what unfortunately does not appear from the official report of the case, on what ground the jury based their award,—whether the three thousand dollars is the residuum of the architect's claim after deducting a certain allowance for loss by his negligence; or whether, disregarding the ruling of the judge, they decided that this was enough for the service rendered by the architect; or whether they failed, as juries will, to make up their minds on the questions at issue, and pitched upon this as being a round sum which in virtue of all the probabilities it was reasonable to allow as a compromise.

THE labor question is making itself felt again in Massachusetts. For a good while the Crispins, the trades-union of the shoemakers, the most powerful in the State, have been making trouble by interfering between the shoe-manufacturers and their workmen; and the trouble has grown so serious that a short time ago a majority of the manufacturers in Lynn decided to give no more employment to members of the order. This resulted immediately in a general strike, which extended to other towns in which the shoe business is predominant. Most of the manufacturers in Lynn united in an "iron-clad" agreement to stop work altogether, though a few of the smaller factories were still kept running. This was soon followed by the shutting-down of the engine-houses which supplied power to the factories on the principal streets,

and by stoppages in Marlborough and Beverly, so that the whole industry is at a stand-still in the eastern part of the State, except where an effort has been made to import workmen from New Hampshire, and in a few shops that are supplied with hands independent of the Crispins. The cause is the usual one, — the lowering of wages by employers on account of the pressure of the times. There seems to be a determination on the part of both employers and men to make the conflict decisive, and both sides are preparing for a long struggle. It looks as if the result would be a serious injury to the towns whose prosperity depends on the shoe trade. Already some of the manufacturers have resolved to move their factories to Boston. The buyers from other parts of the country have united, it is said, in sustaining the masters, and have declared that they will order no goods of men who employ the Crispins.

Meanwhile the unemployed working-men of Boston have held a great out-door meeting, after the fashion of their fellows in San Francisco, but in a more peaceful spirit. Some thousands of them marched through the streets to the Common, where they heard speeches, passed resolutions, and sent a committee to the mayor. The resolutions declared that the introduction of labor-saving machines and the creation of monopolies were rendering the future prospects of workingmen gloomy in the extreme; that they ought to be taken care of in view of the fact that they had always paid the great bulk of the taxes, an astonishing statement which it was believed "could not be disputed by any sensible individual." The remedies demanded were the undertaking of public work for the sake of furnishing employment; out-door relief for those who were not employed; and an appeal to Congress for transportation and money-loans to those who wished to occupy unsettled public land. The repeal of the poll-tax was also demanded, as well as that of the law disfranchising paupers, and the abolition of the contract system; and all attempts to limit the suffrage were sternly rebuked. The mayor answered with great propriety the delegation that was sent to him, reminding them that he had no power to furnish work for them, since the whole power to appropriate money lay with the City Council, to whom a petition had already been presented in their behalf. He added with commendable frankness that he thought it an unwise policy for a city to undertake work in order to furnish employment, and that whenever it had been attempted it had worked ill to the laboring classes instead of good.

No considerate person is insensible to the hardships which unemployed men have to bear in these times. It is not likely, however, that the men who attended this meeting in Boston and passed these foolish resolutions were any greater sufferers or had any greater need of relief than thousands of others who do not appeal for public help. They are said to have been, on the whole, well-dressed and comfortable looking, and to have borne no mark of a hardship that should justify them in claiming such special relief. Of the constituency of seventy-five thousand whom they claimed to represent, it would probably be difficult to recruit any great number without drawing in a large body of Crispins and others who are out of work simply because they will not work for what wages are offered them. It is to be said to the credit of the Boston meeting that it was entirely orderly, and gave no intimation of a disposition to use violence, in spite of an inflammatory sentence or two on its banners; and in so far it invites sympathy. But the truth is, that there are only two things in the name of which a call for public aid can be made: one is charity, and the other communism. Difficult as is the application of charity on a large scale, there is generally willingness when the need is great. But he who appeals to charity acknowledges that he asks a voluntary gift. This is not the attitude of the men who voted these resolutions, nor of the working-men all over the country who are insisting upon their right to be supported. A right to be supported means a right to take so much of other people's property; a right to take a dollar without reference to its equivalent is a right to take a thousand. This means communism, and communism is an ugly thing.

Such inquiry as has already been made into the railway accident at Tariffville, Conn., — where the breaking of a wooden Howe-truss bridge let a train into the river, killing a dozen people, and wounding nearly fifty more, — seems to be enough to show that simple negligence was at the bottom of it. At first, if we may judge by newspaper comments, it was taken as a perfectly natural thing that the bridge should give way under a heavy passenger-train with two engines; the theory seemed to be quietly accepted that a railway bridge should not be expected to carry two engines together, and that there was no need to look for further explanation. The inquest of the railroad commissioners has not as we write yet taken place; but some examinations which are published indicate that the condition of the bridge was visibly unsafe. We find it reported that the wooden chords of the truss were of poor material weakened by decay, having been seven years in place, — exposed, we are told, to the *acids* of rusting iron, — and that many of the angle-irons (cast-iron angle-blocks?) had evidently been broken for a good while. The immediate yielding of the truss is thought to be due to the breaking of one of the iron suspension-rods. These were warranted, it is said, to endure a strain of sixty thousand pounds per square inch, and the weight under which they broke is computed at sixteen thousand. We do not know what such a warrant may have meant; but sixty thousand pounds is the breaking weight for the first quality of bar-iron; and though it might be trusted with a third of this, carefully laid on, a prudent engineer does not subject such material to a live load of more than a sixth of its ultimate strength, that is ten thousand pounds per square inch. If the computations are true, the bridge was in truth not fit to carry the weight put upon it, even if it had been in good condition, and all that it claimed to be; in other words, it was inadequate for a railroad traffic, and ought never to have been built. It was inspected a short time ago by the railroad commissioners; that is, they rode over it in a light train, and considered it safe. Since the accident, the president of the road has requested them to inspect his other bridges. But what is to be said of the duty and responsibility of the officers of the road in such a case? If the appointment of railroad commissioners, and their inspection, is to relieve railway officers of the responsibility for the examination and security of their equipment, we should say that the commissioners were of questionable utility.

THE RESPONSIBILITY OF ARCHITECTS.

Lawsuits entered by two architects of New York have lately brought into notice of the courts questions which are continually at issue between architects and their clients, without having received the careful attention or the formal discrimination which the convenience of practice requires. Of some points of these cases we have spoken elsewhere. Both, however, turn more or less on the vexed and little-understood questions: What is the nature of an architect's superintendence? what kind of work is an architect who superintends a building to require of his builder? how far is he responsible for securing it, and under what penalty?

The question how far an architect is to be held responsible for the quality of work done under his superintendence, involves many points which are but vaguely determined in American practice. There are clients, a good many, we fancy, — and perhaps most other people who have not considered the matter agree with them, — who think that an architect's superintendence ought to include a guaranty of complete excellence in workmanship and material; that unless a builder is so closely watched that he has no chance to slight his work, or scamp his material, or to get any thing wrong at any point, the architect has not done his duty. This is in reality requiring that the client shall be relieved from all risk whatever, and that every such risk shall be borne by the architect. It is a perfectly intelligible requirement, and if all the other conditions are made to conform to it, not to be complained of when once agreed upon. It requires, however, that the architect's eye or his deputy's shall never be off the work that he superintends; and this means, for watching every building of any importance, the whole of a capable man's time.

For the salary of such a man, and the personal care and risk which the architect cannot avoid, the third part of an

architect's fee, which is usually allowed for superintendence, is quite insufficient; in fact, in many cases, the whole fee, as at present rated, is not more than a fair compensation for this kind of supervision. There are, it is known, in some of our cities, certain men who take the whole charge of buildings as superintendents directly from clients, and who charge for their service a fee equivalent to an architect's. It is not rare for them, it is true, to agree to "throw in" plans and specifications; but these they are used to regard as trifling matters and of little value — which indeed in the administration of these gentlemen they usually are.

The minute and incessant supervision which is required from this point of view is not necessary in many cases, and it certainly is not habitual. If one enters into the scramble of general competition it is desirable as a defence against the tricks of many contractors, and possibly money enough may be saved out of cheap builders to make it profitable; but it is nevertheless an unwholesome state of things that makes it necessary, a condition that is best avoided in each case by keeping work out of hands that are not to be trusted. It should be said, too, that the degree of responsibility to be thus secured is compatible only with absolute authority on the part of the architect. It cannot be demanded when the architect is not entirely free in the choice of contractors who shall bid or mechanics who are hired for the work; and any interference of the client with builders or men, or any orders given not through the architect, must be held to vitiate it. In the case of Mr. Hunt, the counter-charges against him of injury to the building from his negligence were rebutted by showing that the client had interfered to set aside his provisions, and had given independent directions to the workmen; which was held to clear the architect of accountability.

A stringent system which should make an architect thus answerable might perhaps be established here, and would doubtless please some persons. We doubt however, if it is suited to the present habits of our people, and we should say that the English practice of employing a clerk of the works, to be paid by the client and directed by the architect, was a more satisfactory one. At all events no such system exists among us. In ordinary practice, a fair supervision is one which assures that mistakes, or deviations from plans and specifications, shall not be made, and that the general standard of work and material shall be satisfactory. This gives work enough to the faithful architect, and is all that the one and a half per cent allowed for superintendence in his regular commission will pay for. It does not mean such watchfulness that the dishonest contractor can have no chance to smuggle anywhere any bad work or material, or to neglect any detail. The proper security against this is in the choice of a contractor. It does secure that on the whole he shall not put off an inferior piece of work for a good one. For the faults of the builder the architect is not responsible after the exercise of reasonable diligence. In the case of Mr. Gilman the judge charged the jury that "an architect is only required to perform his work with ordinary care, diligence, and skill. Ordinary or due skill means that degree of skill which men engaged in that peculiar art usually employ;" and also that for any delay in the completion of the contract, the architect is not responsible unless it be the result of his own negligence in superintending. The charge to determine, "if the work and material were defective, whether such defects were in consequence of or owing to the negligence of the plaintiff in any regard," implies that in the mind of the court, such defects might occur without being chargeable to the negligence of the architect.

In one respect we have been using the word responsibility and its synonymes somewhat vaguely, without stopping to define what kind of responsibility we meant. The only kind that is of much satisfaction to the client is that which makes the architect pecuniarily liable; and here arises the question, How far shall this liability extend? We have not opportunity to examine cases bearing on this point, but we believe the common understanding here to have been that the architect is liable only to the amount of his commission. In France the law is much stricter, and extends the liability to the whole fortune of the architect. The language of the charge in Mr. Gilman's case is not without obscurity, nor altogether coherent; but certain passages seem to show clearly that the court meant to hold the architect liable, when the faults could be referred to his negligence, for the whole amount of the damage. Thus the court charged that "for any damage the defendant [the client] has sustained through neglect of the plaintiff, if there be any neglect, . . . the plaintiff is liable, and the amount of such damage should be allowed in this action to her." And again: "If the jury are satisfied that the plaintiff did not exercise ordinary care, diligence, and skill, . . . then the defendant is entitled to such damages as were occasioned thereby, and such damages are the costs of making the work a good job according to the requirements of the contract."

It is to be noticed that on one point the charges of the judges in the two cases were in direct opposition. The judge in the Gilman case charged that "the burden was upon the defendant to establish that the plaintiff did not exercise ordinary care," etc.; the judge in the Hunt case, that the architect must show that he did use proper care, and that the injury to the building was not due to his neglect. We will not venture to touch the question on which side the presumption lies, from the legal point of view. As a matter of equity and reason, it seems at first glance rather severe to say that whenever an architect's work is called in question the presumption shall be that he is wrong, and he must therefore prove himself to be right; as it would be to assume in case of a physician that he was guilty of malpractice till he had proved that he was not. There is, however, something to be said on the other side: that it is difficult to prove neglect except by showing its results; that it is assumed that an architect can by reasonable diligence guard against serious faults in the work which he superintends, and therefore that the existence of such faults in such work is itself a presumption of his neglect. But again, this depends very much upon whether the faults are such as were in the nature of things visible to ordinary scrutiny as the work went on, or, as is oftener the case, faults which developed later in consequence of imperfections which were hidden during its progress. In most cases the question of the presumption would probably be a merely formal one; for an architect accused in court of malpractice would be sure to do his best to show that he had been faithful. It is only in difficult and doubtful cases that the presumption would have any influence; but then these are just the cases for which presumptions are established, and for these the ruling of the judge in the Hunt trial looks a little oppressive.

Another thing that strikes one in comparing the two trials is the absence of all concern for the contractors. Here were two buildings, one of which, according to the owner, had been damaged to the cost of a hundred thousand dollars, and the other to the cost of twenty thousand, by faults which had been committed by the contractor, if they were permitted by the architect; but the only remedy which seems to have occurred to the client was to stop the payment of a fraction of the architect's fees. A loss of a hundred and twenty thousand dollars is a thing to which people are not apt to submit quietly if they can help it, and to which the fees retained were a mere bagatelle. Yet there is no mention of any action to recover from the contractors. It is true that a client, to whom his contract leaves no option but to pay what his architect certifies to, may not unnaturally be roused by anger to turn against the adviser who has led him to pay for what was not worth his money. Nevertheless in such cases the contractor is the chief delinquent, and we have never heard that the certificate of the architect relieved him from responsibility in case his work turned out bad. The architect has his own immediate responsibility, for which we are in favor of holding him to the strictest account, for errors in his plans and construction: in regard to the faults of the builder whom he is to oversee, his position seems to be analogous to that of one who indorses a note for its principal. The architect has his remedy for the loss he may have had to make good, in a suit for damages against the builder who has deceived him as well as the client; but we do not believe it is for the public good to encourage contractors in thinking that if they slight their work to its detriment, the first consequences will fall on the architects who oversee them.

It is greatly to be desired that a consistent usage in all the points that we have been discussing should grow up, and that what usage obtains should be distinctly recorded in the decisions of the courts. We have never been in favor of laxity in the professional dealings of architects. We believe

in such requirements as shall make it necessary for an architect to know his business, and attend to it. But clients who are not satisfied with ordinary precaution, and wish to be sure that their intentions are carried out with exactness, ought to be informed that this requires more minute supervision than belongs to an architect's regular service or is paid for by his usual fee. The introduction of the clerk of the works is meant to meet this want, and it does so sufficiently well; but it adds to the cost of superintendence. Those who want absolute security must pay for it; and those who call for plenary responsibility must in reason be careful that they allow plenary authority.

PAINTING AND SCULPTURE AT THE CENTENNIAL EXHIBITION. — 1.

[The report of Mr. John F. Weir in behalf of the judges of Group XXVIII, embracing Plastic and Graphic Art.]

No department of the International Exhibition attracted more general attention than that of the Fine Arts, in Memorial Hall and its Annex, nor was any department the subject of more frequent and extended comment in the newspaper press.

This fact is significant; for the marked and general eagerness of the public to view the art-exhibits of the various nations evinced a very decided partiality for the attractions afforded by this display. That this susceptibility to the influence of art exists to a much wider extent with the public than may have been supposed, and that it only awaits opportunity for its proper gratification, is a natural conclusion. Museums and academies of the fine arts have become a prominent feature in our larger cities; and with the increase of facilities thus afforded for study and discipline a very earnest and general desire is manifest on the part of the public for a more intimate knowledge of art than has hitherto been possible, except with those who have been able to seek this knowledge abroad.

These institutions, therefore, are not in advance of the general tendencies of the time, or of the wants of the people. The wealth of the nation is gradually insuring that leisure or repose which follows material development, and which is perhaps essential to the promotion of intellectual pursuits. From this source, also, follows the accumulation of works of art that a far-reaching commerce supplies; and the demand for the more mature and refining fruits of civilized life is becoming select and discriminating. Private collections, comprising in many cases the works of the most distinguished living artists, and in some instances their chief productions, are now by no means infrequent. The recent exhibition at the National Academy and the Metropolitan Museum of Art, in New York, of the selected works of contemporary art from these private collections, could hardly have been surpassed, within its limits, in any country, in its representative character. Consequently the art-exhibit at Philadelphia afforded few surprises for which the American public were unprepared, nor did it contribute materially to the knowledge we already possessed, through our own collections, of the present state of the fine arts among the different nations of Europe.

But it is through the opportunity for comparison, afforded by international exhibitions, that the marked peculiarities which distinguish styles and schools of art strike the observer with more than usual force. Their merits and demerits, also, are rendered more conspicuous through this severe and uncompromising test of juxtaposition, where they enter into close competition and fill the eye in rapid succession. Passing from one gallery to another, one is not insensible to some such experience as that of encountering a foreign tongue: every successive impression is in turn dominated by certain characteristic forms of expression peculiar to each nation. Thus it may, in some measure, afford a test of true excellence when it is found that the artist rises above the conventional level of local sympathies, and attains the higher plane of sentiments which are general and universal. For art, in its truer forms, is a common language, requiring no other interpretation than that derived from its own inherent powers of expression. Time and distinctions of race are obliterated in its universal aim. When, therefore, the art of any people appears to require some special explanation by reason of its local character or the fashion of a time or place, we may conclude that it is so far mannered or conventional, and consequently inartistic.

In discussing the merits and characteristics of the art-exhibits of the different nations, it is but proper to view them with sympathy, so far as this is consistent with those principles upon which sound judgment is based. It is proper, also, to abstain from that narrow notion of applying a standard of estimate which is derived from a decided predilection for some one form of excellence in art to the exclusion of others. This is a common error in criticism, and one to which national prejudices are apt to contribute. It is quite possible for even the more honest and unsuspecting to be sometimes unconsciously swayed by certain unwarranted preferences, from the influences of which they cannot escape; for art is pre-eminently a question of impulse and feeling, and when these are undisciplined or enlisted in some earnest and concentrated end it is not generally conducive to wide likings. But it should be remembered that as art has manifold forms of excellence which are rarely united, and then only in the works of very exceptional genius, these forms of excellence vary in all times and countries with the talents displayed in their manifestations.

The following table will show what nations participated in the Exhibition, and to what extent: —

Nations.	Oil-Paintings.	Paintings in Water-Colors.	Sculpture.
1. England	193	54	11
2. France	302	103	73
3. Austria	123	26	8
4. Germany	145	12	12
5. Belgium	173	3	82
6. Netherlands	109	..	1
7. Spain	141	3	23
8. Italy	126	..	325
9. Russia	63	2	8
10. Denmark	13	..	..
11. Sweden	60	11	2
12. Norway	32	..	5
13. Canada	156	..	..
14. Argentine Republic	34	..	..
15. Brazil	10	3	5
16. Mexico	45	..	6
17. United States	760	180	163
Total	2,567	404	675

Number of galleries and halls, 71.

GREAT BRITAIN.

The exhibit of Great Britain in painting was very complete and satisfactory. Manifestly the desire was to show not merely the present condition and progress of her art to the best advantage, but, by a liberal contribution of the works of many of her deceased artists, the property of the Royal Academy, to express, as well, a generous interest in the success of the International Exhibition of 1876. This friendly disposition deserved and received a most hearty recognition on the part of the people of the United States.

In discussing the merits and characteristics of English art we are naturally led to consider English sentiment and character as manifested in this form of expression; for it may be accepted as a self-evident truth that the art of a nation is a true exponent of the habits of mind and feeling peculiar to that people. And certainly English art is strikingly illustrative of this fact. No such marked contrast is afforded by the art of other countries as that which subsists between France and England. English art is formed by moral ideas, and the subject or story is accorded an importance that is not usually recognized in French art: the emphasis of the latter school is given to treatment rather than to subject, and this distinction lies at the root of the developments in the art of these nations.

The leading sentiment in the art of any people is not peculiar to one form of expression: it pervades all; and their literary issues will be found to be of a similar character with those which distinguish their art. From this fact there arises an important consideration respecting the value of international exhibitions in promoting a knowledge of the more subtle phases of thought and feeling peculiar to each nation; and these exhibitions not only enable us to distinguish points of difference, but they also serve to show wherein the nations lose their individuality, in a measure, in the common aims of broader and more profound views of art. English art-criticism is quite distinct from that of Germany or France. It is not without its prejudices, but these are not more marked, as a general thing, than are those of the other countries: the distinction in this respect is one of kind rather than degree. It has been observed with clearness by a recent English writer that "the poles between which æsthetic criticism has always oscillated, and will continue to oscillate, are those of form and expression, — the objective and the subjective truths involved in art, as in every other production of the human mind;" and French and English art are, in a measure, representative of these two fundamental ideas, which it is well to harmonize, and which are found united in truly great works of art. This exceptional and proper union may be met with in some of the pictures of the English collection; and it is from them we derive a most favorable impression of what is really excellent as well as characteristic in English art. As a general thing, its character is exclusive and affected by insular tastes. This has been partially modified, and we find occasional evidence of outside influences affecting the traditional methods of this school.

Passing in review the English exhibit of oil-paintings, the impression made by the collection, as a whole, is that of lack of technical grasp. The methods are, for the most part, thin and stained in appearance, and the coloring tawny and monotonous. But in delicacy of sentiment, in the expression of ideas and emotions, and in the pure and poetic feeling manifested in many of the pictures, they possess much that demands the highest praise.

"The Summer Moon" and "Interior of a Jew's House," by

Mr. Leighton, are works deserving of special commendation. The former is exquisitely poetic in sentiment, rich and suggestive in tone, and admirable in grace of composition. The "Interior of a Jew's House" is a complete poem from the ancient world. The title is somewhat ambiguous, as it furnishes no clew to the picture, which has the character of ancient Greek civilization in sentiment and surroundings. The figures are painted with rare skill and grace, the drawing is admirable, and the archæological learning — which seems to be a matter of special pride in art to-day — is most thorough. Few pictures are equally fine in sentiment, and at the same time so thoroughly well rendered with technical skill, as these by Mr. Leighton.

"The Vintage Festival," "The Convalescent," and "The Mummy," by Mr. Alma Tadéma, — who, though a Belgian, is classed of late with the English school by reason of his residence in London, — are in a somewhat similar vein, yet with entirely distinct individuality in treatment. In their technical qualities these pictures are no less admirable than for their learning and beautiful conception. It may be said, advisedly, that no pictures of the present day exhibit more thorough qualities of excellence than those by Mr. Tadéma. Though, for the most part, Greek and Roman antiquity are the sources from which the inspirations of his art are derived, Mr. Tadéma's pictures, as works of art, are never sacrificed to the mere pedantic display of skill and learning. Archæology and brilliant *technique* are features prominently displayed in contemporary art, and to a degree that may perhaps be regarded as dangerously subversive of truer aims, — the emotional, the thoughtful, the expressive, — which render art something more than mere manifestations of learned research, skill, or manual dexterity; and it is agreeable to find that in the works of Mr. Leighton and Mr. Tadéma they are properly subordinated to these higher aims.

"Trawlers Waiting for the Darkness," by Mr. Hunter, is a picture of very exceptional power, both in sentiment and in the admirable vigor of its treatment. The breezy expanse of sea at twilight, and the fishermen resting in the boat, are rendered with great truth. The picture is full of the solemnity of the hour and of nature.

"God-speed," by Mr. Boughton, though in many respects representative of the excellent qualities of his art, is not thoroughly satisfactory. The composition is scattered and broken into episodes, and the sentiment a little strained. Mr. Boughton is better represented in the exhibit of the United States, where he is claimed as a fellow-countryman by birth. His "New England Puritans going to Church" and "Going to seek his Fortune" are more satisfactory compositions. The sources from which this artist draws his best inspirations are Chaucer and our Puritan forefathers; and no one has entered more thoroughly into the spirit of the time and the customs thus respectively derived, and with a more genuine sympathy, than Mr. Boughton.

"The Lord gave, and the Lord hath taken away," by Mr. Holl, though painful in subject, is rendered with great delicacy and pathos. The expression of sorrow which pervades the figures, and fills the place where death has left a void as with an atmosphere oppressively sad and afflicting, is wrought out with great power and truth. The picture manifests a most penetrating insight of heart-rending grief, yet so delicately and sympathetically depicted, that while we condemn the choice of subject as too painful, we cannot but admire the consummate skill of the artist evinced in this remarkable work. "Betty," by Mr. S. L. Fildes, is fresh and animated, well drawn, full of spirit and hearty grace. It proved one of the most attractive pictures of the Exhibition. Mr. Fildes's "Applicants for Admission to a Casual Ward" is a subject no less painful than that chosen by Mr. Holl. It is, however, a work of great power, and abounds in admirable individualization of character. But it is in such pictures that we find the tendencies of the English school, in moral aim, perhaps carried to excess. It is a question open for discussion, how far the artist may venture in depicting human suffering to accomplish strictly moral ends without endangering the distinctive æsthetic character of art, which is calculated to elevate rather than depress human feeling. This may be effected through sentiment expressed in a minor key; but should there not be a vista of hope through which we may discern some alleviating power at work, which leaves the sensibility in a less morbid state? Even in the tragic drama the feeling of horror and dismay is properly surmounted by sentiments of a loftier and more triumphant character, that redeem the depression and the pain which would otherwise plunge the spectator into a most unhappy mood. He leaves the play, therefore, with his sensibilities gratified, and his emotions are, on the whole, pleasurable. But the very nature of painting, from its immobile character, precludes a similar movement of the moral action in scenes like this depicted by Mr. Fildes. They remain, therefore, transfixed, painful moral lessons rather than true works of art. If the end sought is purely moral, painting is not a legitimate means for its accomplishment, for its manifestations outlive the occasion and become too distressing for permanent contemplation. We do not question the rare skill and profound observation of character evinced in these pictures by Mr. Holl and Mr. Fildes, but we cannot but think their choice of subjects would have been better suited to less labored and less enduring forms of art.

"Circe and the Companions of Ulysses," by Mr. B. Riviere, is conceived and executed with that rare skill which deservedly entitles this artist to the high reputation he enjoys. The humor is admirably rendered, and exhibits a keen appreciation of the possibilities of expression in swinish physiognomy. "The Sick Child," by Mr. J. Clark, is pathetic and tender in feeling, — a sincere representation of that true touch of nature which makes the whole world kin. Few pictures of the English school evince more admirable qualities than this by Mr. Clark. "Baith Faither and Mither," by Mr. Faed, — who has done for Scottish art what Burns has done for Scottish song, — is thoroughly characteristic of that phase of the British school which is perhaps the most widely popular, and with which its public are most sympathetic. The story of this "motherless bairn," who, about to set out for school, turns to her father for some little assistance required in her dress, is told with very tender pathos. It is the translation into painting of a subject suited to a poem. It is illustrative and readable, and in technical merit of a certain kind it is in many respects admirable. It is rather poetic than artistic, — if the distinction explains itself. The conspicuous values are in the telling of the story rather than in the pictorial treatment.

In portrait-painting, the most notable examples of the English collection are Mr. Watts's portrait of Millais; portrait of a lady, by Mr. Perugini; Hon. W. E. Forster, by Mr. Wells; "The Three Sisters," by Mr. Archer; and Earl Russell, by Sir Francis Grant. Mr. Watts's head is cleverly painted, unconventional, and spirited. Mr. Perugini's is delicate, sensitive, and refined. Mr. Holman Hunt exhibits a portrait of himself which is rather serious than pleasing. It is thoughtful and serious, as Mr. Hunt's work always is; but the coloring is disagreeable. It is to be regretted that this artist was not more adequately represented: certainly no pictures would have had greater interest for his many friends in this country than those which have made his name so widely and favorably known. Mr. Millais, also, was by no means properly represented in the single portrait-sketch which bore his name. Considering the prominence of these artists, and the very decided originality of their styles, the British collection suffered a serious omission in the absence of characteristic examples of their work. It cannot be said, in reviewing English portrait-painting in the collection at Philadelphia, that we discover in recent work, even remotely, those qualities of excellence evinced in Reynolds's portrait of himself, loaned by the Royal Academy. This portrait is something more than the mere likeness of an extraordinary man; and portrait-painting, to be of interest to the world at large, must have a far higher aim than that of securing a likeness. The portraits of Reynolds and Gainsborough were signally typical of a noble and aristocratic race. Time has wrought no decadence in the type, but it certainly has in the art, and English portrait-painters of the last century preserve a prestige which overshadows their successors of the present day. This may be partially accounted for by the fact that the most talented artists of this school are now altogether absorbed in *genre*.

The two pictures by the late Sir Edwin Landseer, loaned by Lord Northbrook, were specially valuable as illustrating the change of manner — or rather the transition of manner into style — in this artist's work. "The Travelled Monkey," which evidently is an early picture, is one of a series that was etched in Landseer's "Monkeyana," published many years since. The method is hard and dry, and, on the whole, very old-fashioned, but it is not lacking in character, for which his pictures were always remarkable. The later work, "The Sick Monkey," is something more than this: it is rich in color, admirable in technical dexterity, broad and simple in composition. Mr. Frith's "Pamela" is attractive and pleasing, but his "Railway Station" did not gain the attention here that it did in England. Sentiment is preferred to a mere fact, where this latter is an affair of every-day occurrence, and related to our practical needs; and Mr. Fildes's "Betty" had its throng of admirers, while Mr. Frith's picture was somewhat neglected. Mr. Frith understands, on his own ground, that to be popular it is always necessary to get down to the level of popularity. His pictures show an entire lack of mystery; they are crowded with numerous incidents and stories, well told, and calculated to amuse the curious. But this is not art in any high acceptation of the term. The stories once read, we do not return to Mr. Frith's pictures again and again, as we are instinctively drawn by great works of art. His "Marriage of H. R. H. the Prince of Wales" was an object of interest to a continuous throng of spectators, for the reason that whatever pertains to England's sovereign is always a subject of interest, and even affection, to the people of the United States.

Mr. Brett contributed his "Morning among the Granite Boulders," which is in part admirable, particularly in the truth and simplicity of his treatment of the foreground, — an expanse of shore strewn with rocks. The distant sea and sky are painted with less skill, and are crude in color; but, on the whole, the picture is one of exceptional merit. "After the Battle," and "The Siesta," by Mr. Calderon, are both clever: the former tells its story with very decided interest; the latter is probably a more recent work, evincing greater breadth and freedom in execution. "From under the Sea," by Mr. Hook, is a realistic work of decided power, displaying a strong, vigorous sense of nature. "De-

lin's Arbor," by Mr. George D. Leslie, is graceful and delicate, though not skilful in its technical qualities. Mr. Poynter's "This Girl" is also a work of decided merit. These pictures are representative of those qualities which constitute excellence in English art. The sentiment is rarely sacrificed to mere technical display; on the contrary, the latter is hardly equal to the standard attained by some other painters of this school.

On the whole, the impression made by the British art-exhibit was a decidedly favorable one. English art, as manifested in the best examples sent to Philadelphia, is poetic, pure, and sincere in character. While it sometimes sinks to the level of mere platitude, it is seldom strained, frivolous, or vulgar. As a school, it does not abound in painters of exceptional merit, but its representative artists are not surpassed in those qualities which constitute true excellence, nor any painters of the present day more learned in the technical requirements of the art.

In landscape-painting the English exhibit gave the impression of a prevailing mannerism that was neither agreeable nor vigorous; but Mr. Hunter's "Trawlers Waiting for the Darkness" is a very marked exception to this criticism, manifesting great individuality. In water-color painting the superiority of the English has been long acknowledged; it is of late, however, very adequately rivalled in France, and perhaps in some cases in this country. Messrs. Tadéma, Linton, Jopling, Marks, Callow, and Gilbert were well represented in this branch of art.

The British exhibit in sculpture was slight. The bust of Flaxman by Bailey, and that of West by Chantrey, loaned by the Royal Academy, were of interest, and the Venus, by Gibson, is worthy of his reputation; but these are all deceased sculptors. The large terra-cotta group of "America," from the Albert Memorial, by Mr. John Bell, is not without vigor and merit, though decorative in character. At the present time England possesses no sculptors of more than average ability, nor is a susceptibility to pure form a national characteristic.

APPLICATIONS OF THE EQUILIBRIUM POLYGON TO DETERMINE THE RE-ACTIONS AT THE SUPPORTS OF ROOF-TRUSSES.—I.

BY JAMES R. WILLETT, A. I. A.

[A paper read before the Civil Engineers' Club of the North-West, Chicago, Sept. 4, 1877.]

Several works have been written on the graphical analysis of roof-trusses; but in none that I know of have the re-actions at the supports been determined graphically, except when the loads were symmetrical and vertical. The purpose of this paper is to explain how, by means of the equilibrium polygon, the re-actions may be really obtained when the loads act in a variety of directions, no one of them being equal or parallel to any other. Bow's notation is used throughout. It is presumed that the reader is acquainted with so much of graphical calculation as is shown in Bow's "Economics of Construction,"[1] Von Ott's "Graphic Statics,"[2] or Greene's "Graphical Analysis of Roof-Trusses."[3] If a comprehensive work on graphical statics is desired, it can be found in Du Bois's "Graphical Statics."[4]

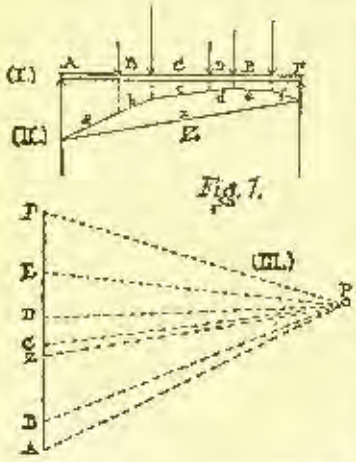


FIGURE 1

Shows the equilibrium polygon as applied to vertical loads: it is similar to that shown in most works on graphical statics, and is given here to introduce the subject, and to exhibit Bow's notation as applied thereto.

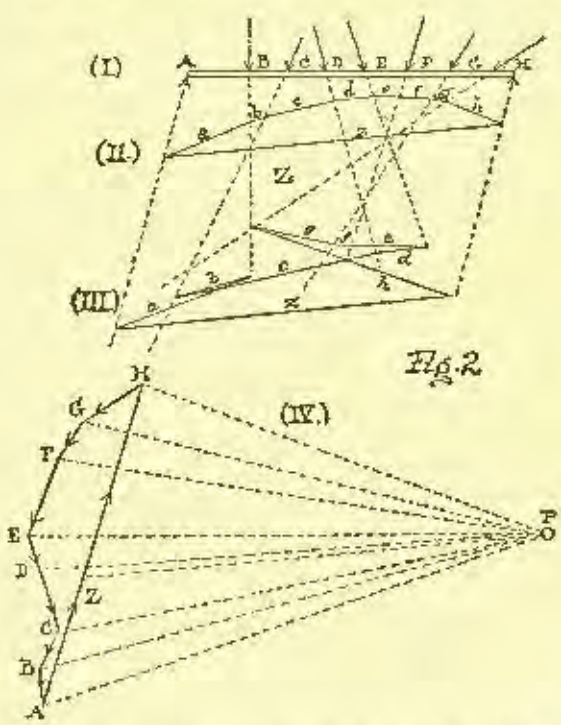
The loads are supposed to be applied to a beam shown in (I). The loads A B, B C, etc., are laid off (III) in a straight line, since they are all parallel. This constitutes the load, or force polygon; and its closing line AF overlies all the loads. Now the question is, AF being the sum of both re-actions, how much of it is borne by each support.

Any point, P, is assumed as a pole; and lines are drawn from this pole to the ends of the several loads, A, B, C, etc. Then, parallel to those lines, are drawn in (II) the lines a, b, c, etc., cutting the direction of, and being terminated by the prolongation of, the loads A B, B C, C D, etc. (I). Thus, from any point on the line AZ, the line a is drawn parallel to the line PA (III) from the pole to A. From the right-hand end of a, b is drawn parallel to PB, and from the right hand of b, c is drawn, and so on, until at last FZ is reached. Then the closing line z is drawn. By drawing from the pole P (III) the line PZ, parallel to z, the point Z is obtained, which is the dividing-point in AF; AZ being the re-action at one support, and ZF the re-action at the other.

One advantage of Bow's notation may here be noted. The line a in (II) crosses the space A (I), and is parallel to the line in (III), from the pole P to A. The line b in (II) crosses the space B (I), and is parallel to the line PB in (III), from the pole to B; and, generally, the line in (II) crossing the space between the directions of any two adjacent loads in (I), denoted by any letter, is parallel to the line in (III) from the pole to that letter. This is of use in keeping track of the corresponding lines.

FIGURE 2

Indicates a beam which is acted on by unequal loads acting in various directions. The load or force polygon is shown in (IV), the loads being there laid off in both direction and amount. HA is the closing line; that is, it gives the sum of the re-actions at both supports: P is taken as the pole. Two equilibrium polygons



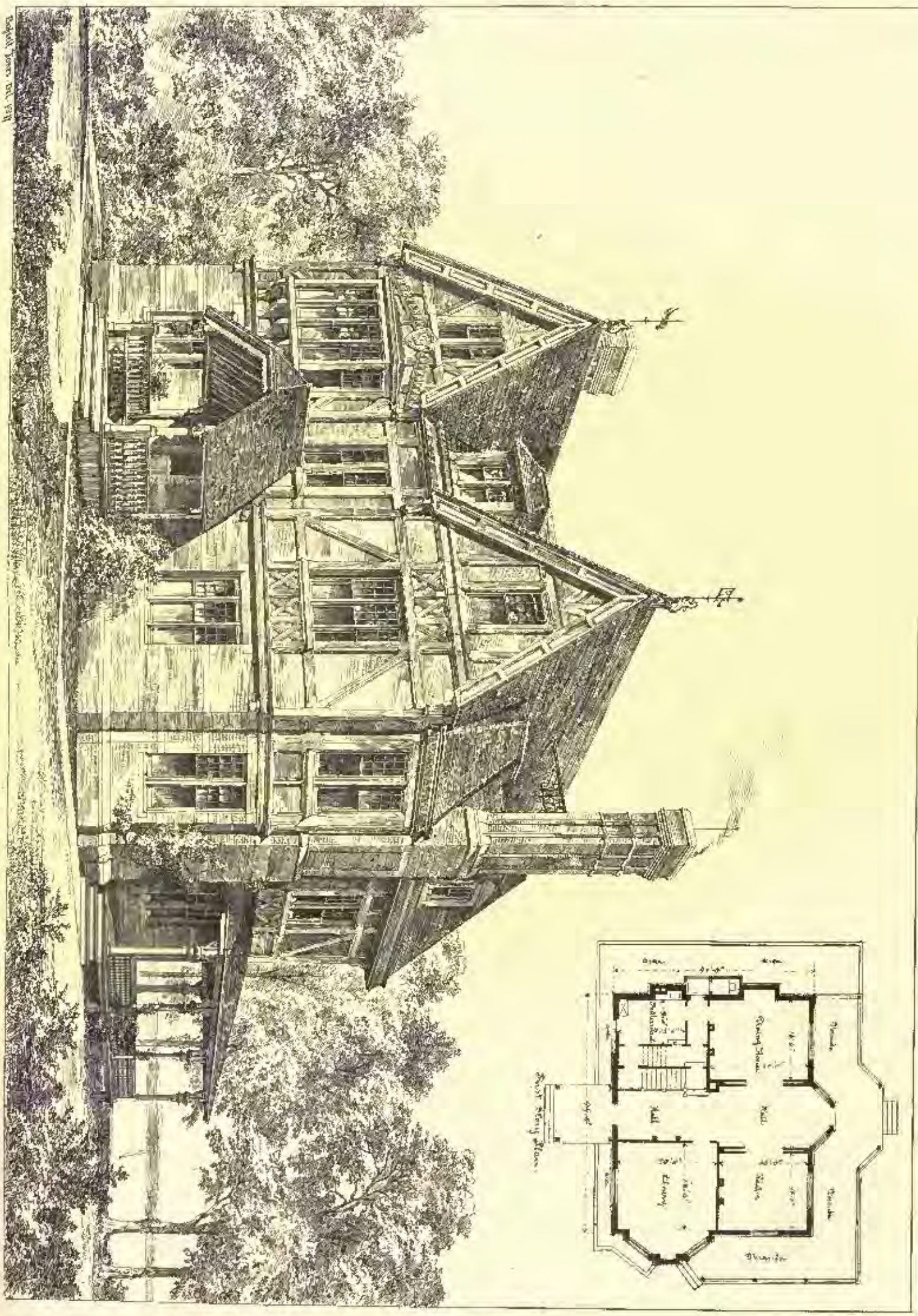
are shown. We will first consider that shown in (II). This is drawn exactly as previously described for Fig. 1. A point on the direction of the force AZ is assumed; a is drawn parallel to PA (IV) until it cuts the direction of the next load or force AB. b is drawn parallel to PB, and so on. z is the closing line of the equilibrium polygon; and a line parallel to this, drawn through P, will give the point Z of division in the line AH; A Z being the re-action at one support, and ZH at the other.

When the point of commencement of the line a is assumed lower down, as shown in (III), the equilibrium polygon will assume a different shape; but, if it is correctly drawn, the closing line will be parallel to that found in (II). The only precaution to be taken is to be sure to draw the lines of the polygon from the direction of one load or force to the direction of the load or force which is next adjacent *at the beam*, although, in so doing, you may cross the direction of other forces.

Thus in (III) the line a is drawn parallel to PA (IV), from the direction of the force AZ to the direction of the force AB, although, in doing so, it crosses the direction of the force BC; because, at the beam, AB is adjacent to AZ. Then b is drawn from the direction of AB to the direction BC, although, in doing so, it is drawn towards the left. Then c is drawn from BC to CD, crossing the direction of several forces; and generally, the letters being placed in alphabetical order between the forces at the beam, the lines of the equilibrium polygon are drawn in the same order from the direction of AZ to the direction of AB, from AB to BC, from BC to CD, and so on.

The two equilibrium polygons shown in (II) and (III) are of different shape; but their corresponding lines are parallel, their closing lines included: consequently the line drawn through P, parallel to either closing line, will cut AH in the same point Z.

[1] Economics of Construction in relation to Framed Structures. By Robert H. Bow. London: E. & F. N. Spon.
[2] The Elements of Graphic Statics. By Karl Von Ott; translated by George S. Clarke. London: E. & F. N. Spon.
[3] Graphical Analysis of Roof-Trusses. By Charles E. Greene. Chicago: George H. Frost.
[4] The Elements of Graphical Statics. By A. J. Du Bois. New York: John Wiley & Son.



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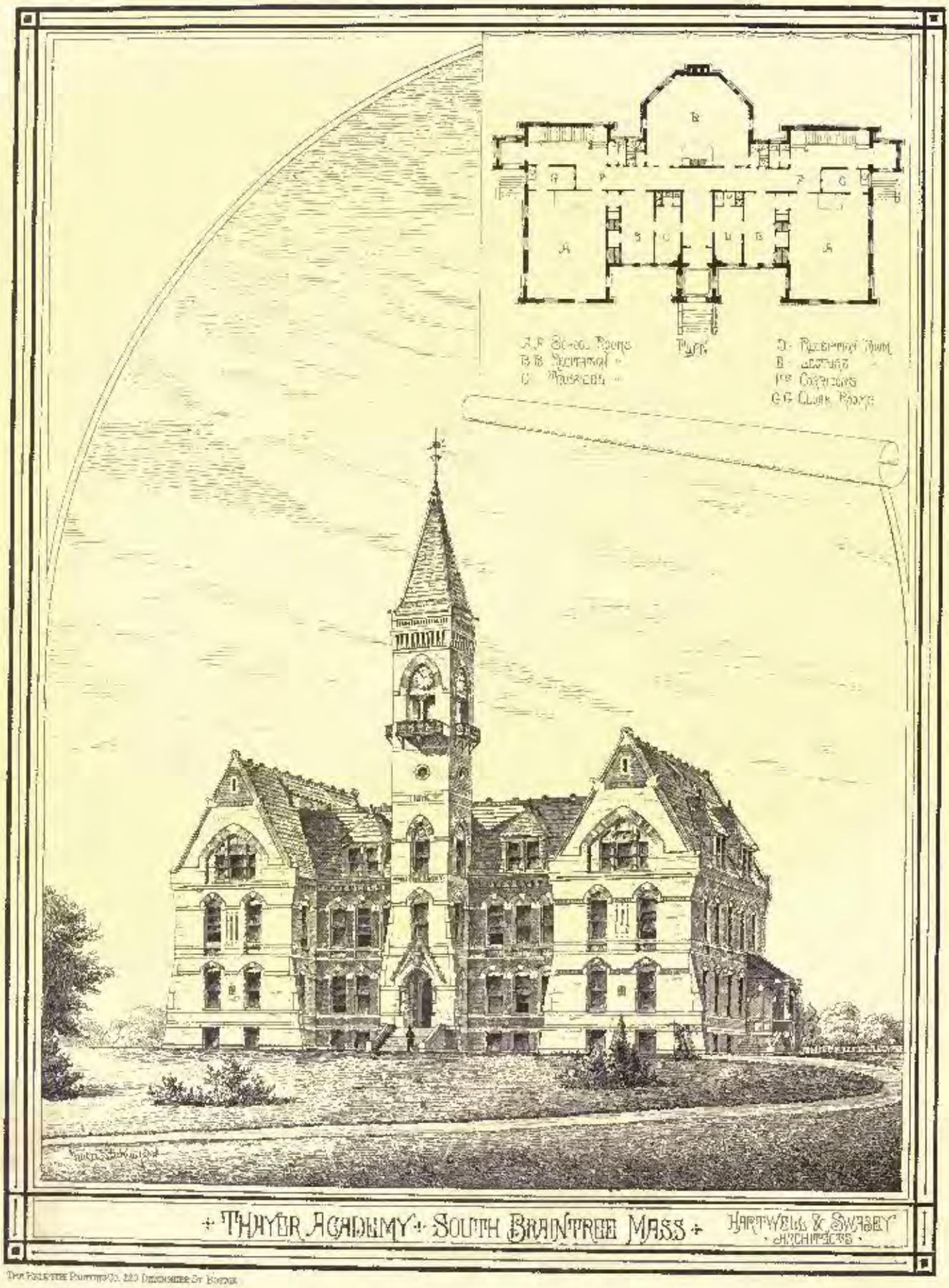
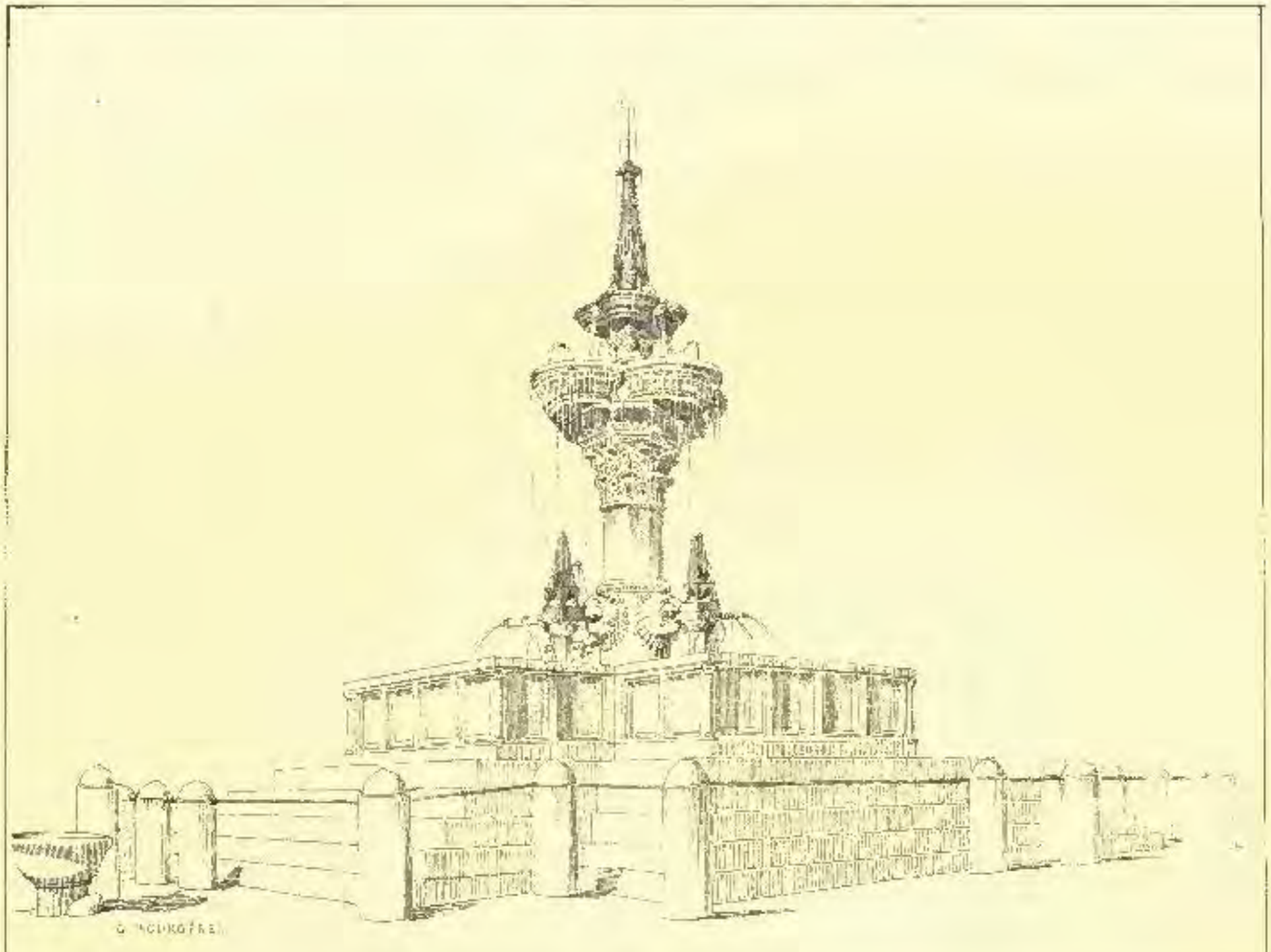


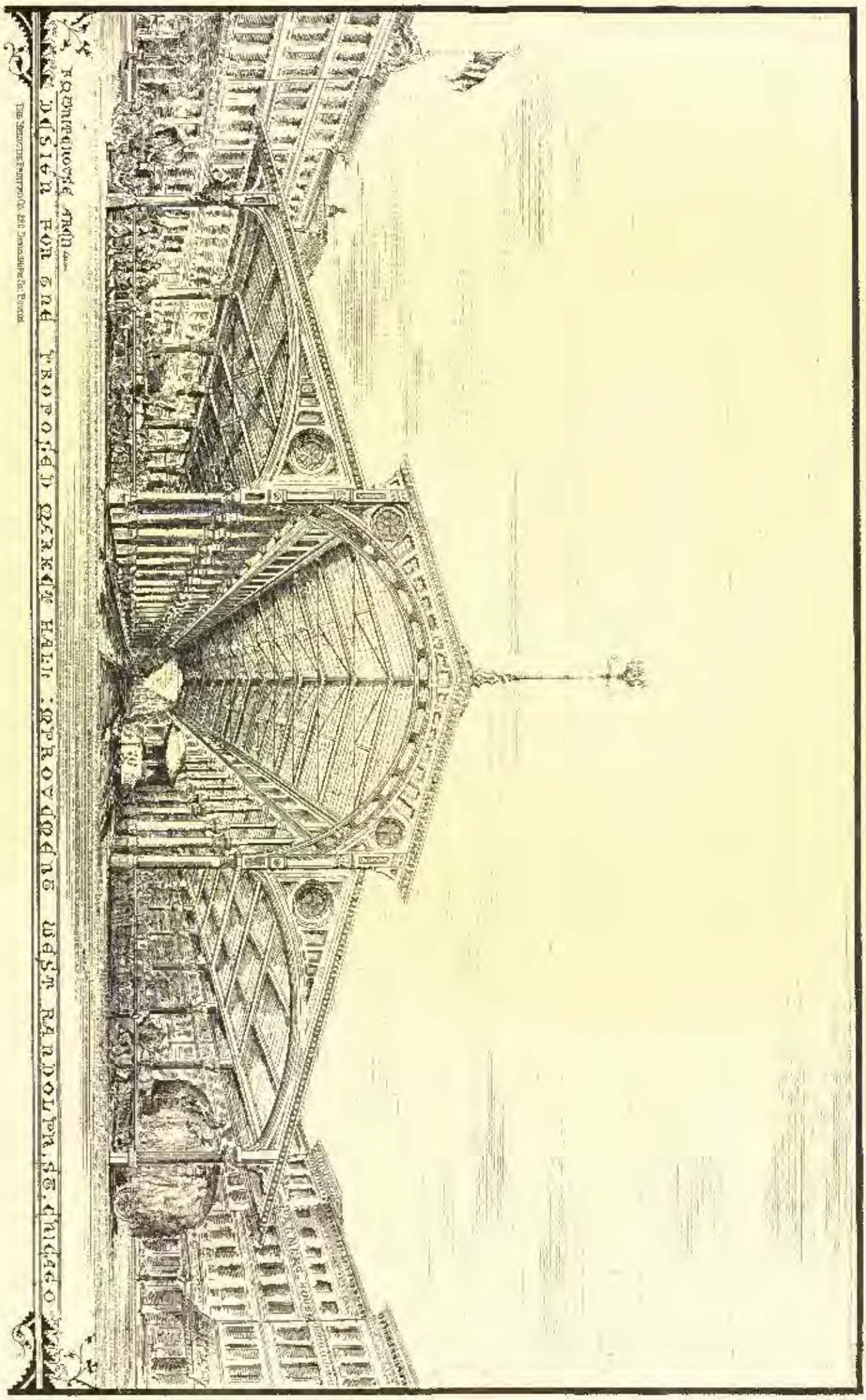
THE PHOTOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON.



FOUNTAIN AT VITERBO, ITALY.

THE HELIOTYPE PRINTING CO. AND PHOTOGRAVERS, BOSTON.

FOUNTAIN AT GRENOBLE, FRANCE.


AQUARIUM ARCH
DESIGN FOR ONE PROPOSED MARKET HALL: PROVIDENCE WEST RANDOLPH, SS. CHICAGO

As there is no necessity for actually drawing the lines from the pole to the points on the polygon of forces, in future they will not be drawn.

FIGURE 3

Is similar to Fig. 2, except that some of the forces act in an upward direction; but that does not affect the solution.

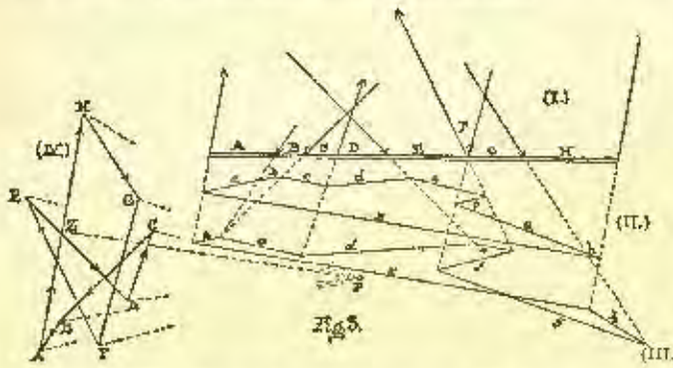


Fig. 3.

Diagram (III) is the load, or force polygon; HA being the closing line, AZ and ZH being the re-actions at the supports. There are two equilibrium polygons (II) and (III) for the same set of forces.

It accidentally happens, that, in drawing the line a (III), it strikes the intersection of the forces AB and BC; that is, the lines a, AB, and BC, all intersect in the same point: consequently the distance, in the equilibrium polygon, from AB to BC equal o; that is to say, the line b = o, or disappears, and we have no line b in (III) corresponding with b in (II).

FIGURE 4

Gives a common form of roof-truss. Diagram (III) is the polygon of forces. Since the tie-beam or lower chord is a straight line, and they act at the points of support, the forces HI and 1^2H^2 do not enter into the polygon of forces, as will be shown hereafter. The polygon of forces then is H, G, F, F^2, G^2, H^2, H; the closing line being HH^2. P is taken as the pole, and the equilibrium polygon (II) drawn precisely as before described. This gives Z as the

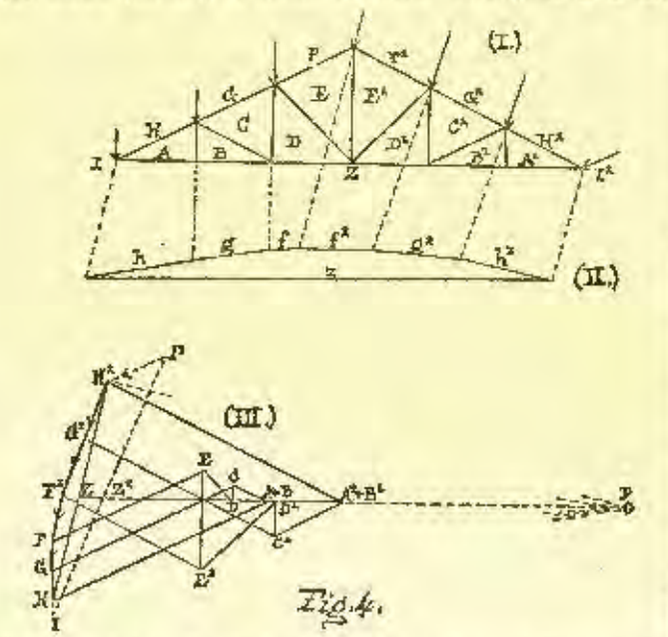


Fig. 4.

dividing-point in the closing line, the re-actions at the supports being HZ and ZH^2. The strains in the members of the truss can then be drawn in the usual way as described in Bow's "Economics of Construction," or Greene's "Analysis of Roof-Trusses."

If it is desired to introduce the forces JH and 1^2H^2, which act directly on the supports, it can be readily done by drawing them as shown in (III); then join J and I^2, which constitutes the closing line of all the forces; and Z^2 is the dividing-point, the re-actions now being IZ^2 and Z^2I^2. The only effect of this on the truss will be to alter the strains in the tie-beam, they being now measured from Z^2, instead of Z; the strains in all the other members remaining the same. This also indicates that two equal amounts of horizontal force might be combined with the re-actions, one added to each, provided such amounts acted in contrary directions, without affecting any other member than the tie-beam. If the work is correctly done, the strain diagram will always close: if it does not do so, it is conclusive evidence that an error has been made in the work.

THE ILLUSTRATIONS.

RESIDENCE OF DE LANCEY KANE, ESQ., NEW ROCHELLE, WESTCHESTER CO., N.Y. MR. ARTHUR GILMAN, ARCHITECT.

This house has been built during the past year in a charming situation on the shore of Long Island Sound, about seventeen miles distant from the city of New York. Besides a desire to maintain the general expression of the old English domestic style, the owner was unwilling to forego the spaciousness and comfort of the ancient Dutch "stoop," so common in the older houses of the country. To meet this wish, the architect has endeavored to bring this local feature into harmony with the general style of the building. The material of the lower or principal story is of Haverstraw brick, with plinth course and bands of Amherst stone, the upper stories being also of brick, with solid exterior framing and bargeboards of a dark oak color. The rear of the house has a spacious veranda, with a semi-octagonal central pavilion and balcony over, which command a noble view of the Sound, and of the opposite hills of Long Island, — a range of upwards of thirty miles.

THAYER ACADEMY AT SOUTH BRAINTREE, MASS. MESSRS. HARTWELL AND SWASEY, ARCHITECTS.

HUCKSTERS' MARKET, CHICAGO, ILL. MR. F. M. WHITEHOUSE, ARCHITECT.

This explains itself as a covered hucksters' market, or *Halle*. It is designed to stand in one of the principal streets, at a point where the street widens for two squares to a width of about a hundred and fifty feet. Men having small vegetable-gardens, and farmers in the vicinity of the city, come with their wagons in great numbers to this point. Frequently there are as many as two hundred or more to be seen there of a morning, weather permitting. The building is to be erected at the expense of the property-holders in the vicinity.

FOUNTAIN AT VITERBO, ITALY.

We here reproduce from the *Fragments d'Architecture et de Sculpture* of M. G. Bourgerel, one of the numerous fountains at Viterbo which were mentioned by Mr. Peabody in his account of a visit to Viterbo, published lately in this paper.

FOUNTAIN AT GRENOBLE (ISERE) FRANCE. M. H. RONDEL, ARCHITECT.

This fountain is a notable feature of the façade of the market *Sainte-Claire*, and is here reproduced from an engraving in the *Revue Générale de l'Architecture*.

ON THE EXCLUSION OF SEWER AIR.

[From a paper read by Richard Wheeler, C. E., F. C. S., Sanitary Surveyor, and published in the *Journal of the Society of Arts*.]

THERE are various reasons why the more perfect exclusion of sewage emanations from the interior of buildings has not attracted that close attention of sanitary engineers which the national importance of the subject demands. The magnitude and the emoluments of out-door works entirely dwarf the comparatively trifling matter of the internal arrangements of domestic drainage; and the indifference of the public to the subject, combined with the simplicity of faith and unwarranted assumption that things out of sight are right, have certainly not hitherto been very encouraging to the reformer.

I know of no one who is more keenly sensitive than myself to the inconvenience of breathing tainted air or drinking foul water; but I cannot approve of the often-uttered expressions by men, even of experience and influence, such as the "deadly sewer-gases," and "death in the cistern." Their opinions, given with good intentions, defeat their object; for people are apt to think that the shades are drawn deeper than requisite, and if the dangers were so great as presented, there would be fewer of us left to talk about it, considering that we all take our peck of dirt in the form of aërial and solid sewage rather frequently.

There are congregations of populations within my knowledge who regularly consume their own filth, and drink up their fluid refuse with the water; places where the receiving cesspits are in such near juxtaposition with the domestic well, that the water lines become identical, and intermittent exchange is maintained; and yet many of these places are considered healthy, and figure so in the Registrar's returns. An example is within recollection of a small town where nothing more loathsome can well be conceived than the social habits of the inhabitants, where for fourteen years the community enjoyed good health before an imported epidemic attacked more than a third of the population, of whom many died.

The remedy for prevailing errors lies in a recognition of their existence, less by legislative action than by reform within the bosom of every family without distinction, and it should rightly begin with those who sit in high places; for my range of observation, if limited, is sufficiently wide to enable me to say with some confidence, that the larger and more important residences are

relatively in a worse condition than the humbler abodes of the working classes, causing necessity for a more frequent change of air and locality, due to the foul state of the atmosphere of metropolitan mansions, — a condition of things rarely suspected, but universally existing. If, it may be said, there is not much detriment to health from the present state of dwelling-houses, when viewed from the point presented by reference to the mortality rates, I still venture to think that much of that indefined indisposition of families — headache, nausea, dyspepsia, lassitude, and such small complaints — are often created by breathing the foul atmosphere of the house, a foulness, most likely, not perceived by the usual inmates.

There is no occasion for me to appear rude, and I have no intention of being so, in the following criticisms; but I am induced to submit them, so as to bring home to every one the fact that, notwithstanding we pride ourselves on our decency and cleanliness, and our inclination to set ourselves up as patterns to Continental neighbors, I say, the fact is, we are a dirty and an unclean people.

A few days ago, I made an inspection of a medical gentleman's house, — a man who is a frequent attendant upon social conferences, and well read in matters of hygeia. Well, when I came to the water-cistern, he assured me the waste-pipe delivered into the ground a little below the surface; but as I make it a point to take nothing for granted in my examinations, and must have personal demonstration, we opened out the subsoil, and found the overflow orifice discharged into a drain directly communicating with the sewer up which air of a fetid character arose. In point of fact, the waste-pipe acted as the upcast shaft to ventilate the house drains and public sewer, the delivery taking place in the cistern an inch or two above the water line. Of course, seeing the defect himself — one of many — the fact was confirmative, otherwise I think it would have been difficult to convince this gentleman of the nuisance.

If a guest enters a drawing-room with boots spotted with honest mud, he is, peradventure, looked upon askance; but it is a matter of no moment that the host immediately charges his lungs with abominations vomited forth from the common sewers, through defective closets and scullery sinks, with which the atmosphere of the house is tainted, curiously hidden in vapor of preparing viands ascending from the kitchen, which no mansion, however modern, seems to be without.

It is a singular thing, and perhaps suspected by few minds, that the conditions essential for the enjoyment of sound, robust health, least exist in localities where they are most required; and I put it to you as the fruit of observation, that our hospitals, as types of public institutions, are the most indecent in respect of their sanitary measures; whilst the gin-palaces, as representative of another class, are the best. In the first, I include public buildings, houses, churches, clubs, schools, hotels, and coffee-houses, with many others; and, in the second, the business parts of butchers', bakers', greengrocers', confectioners', with some other shops. Basing the calculation of averages from an examination of several hundred buildings, made within the last year, I am in a position to say that ninety-nine per cent of metropolitan dwellings are polluted very seriously by the admittance of sewage air through the various openings for the removal of liquid refuse.

Before passing on to the practical object of this paper, the means available for effectually avoiding the current nuisances common to all dwellings, I will intrude upon you one more illustration of the indecencies of modern living, taken from the residence of a sagacious, well-informed gentleman of eminence, — who, always interested in social subjects, is not unknown in this hall, — which I was invited to inspect so recently that the evils pointed out still remain unameliorated. In the first place, in the kitchen, as there is no open fire-place, but close stoves and hot plates, the whole of the volatile culinary products are discharged into the basement, the bulk of which ascend to the upper premises. There are no ventilating appliances in this palatial establishment, but a fair amount of air of a sort is procured from outside the building, conducted through the yard grids, and thence by the scullery-pipes to the several passages of the house. Another supply, voluminous in quantity, is emitted from the soil-pipes of the water-closets, another source being through the waste-pipes of the service cisterns. The air of the whole building — of the magnificent chambers of great length and height, and of the upper offices — is singularly stale and unpleasant. Nevertheless the servants express perfect satisfaction, and profess to enjoy excellent health; but, if this is so, are the conditions of living proper — are they decent even?

It is many years since I became acquainted with the inadequacy and insecurity of the usual hydraulic traps applied to house drainage to stop the back flow of sewer air. At the most, and under the best conditions, assuming perfect joints, and with sound materials, they merely obstructed the rush of air; the passage from the drains to the house took place more slowly and insidiously. Well, after laboring for some time for improvement, I adopted a simple device formed out of a siphon glazed-ware pipe, with an opening at the socket, and communicating with the ground surface for the entrance of fresh air, and then, by the aid of openings at the tops of stack, bath, and soil pipes, to keep up a system of natural and self-acting air circulation throughout the drainage; so that any passage effected through the porous pipes, joints, or traps — very little, perhaps, by reason of the equal tension of the air within and without the pipes — would be robbed of virulence, because the air, being ordinary atmospheric air, and not sewer emanations, is quite harmless. The idea was taken from — and, in fact, was an attempt to adopt underground — the system not much practised in London, but common in provincial towns, of severing connection with the scullery, by delivering the pipe into the air over a trapped grating, but which had never been carried into practice, so far as I know, with water-closets, nor with drains passing through the house.

As the arrangement has become known through the professional press, and by the proceedings of a kindred association, and possibly is known to you, I need not further describe it. I may, however, say that with some years' experience of its working it gives me every satisfaction, as it thoroughly effects complete severance between the house and sewer, preventing the admittance of any foul air and pollution to water, the whole being accomplished at a cost which, I think, is not immoderate considering the substantial benefits derived; and that it does not generally exceed £5 per house in occupied buildings, in new structures practically amounting to nothing extra upon the usual drainage outlay.

Some question has arisen as to the feasibility of implied action of the siphon system of ventilating and trapping drains and sewers, which is best answered by stating the result of many hundred examinations. The air circulation is produced by compound causes; first, we have the currents due to the natural mobility of the air, as exemplified in all vertical shafts open at each extremity, and well illustrated by a chimney-flue without a fire. This motion is accelerated by the passage of water down the pipes, creating a reversed aërial current, and again by the warm discharges from the kitchen. The upward flow is augmented by the heat absorbed from the sun's rays by the ventilating pipes. But the most potent agent in keeping up the circulation is the wind blowing squarely across the mouth of ventilating pipes, creating an exhaust and consequent up-current, for it is old knowledge that the rapid passage of a fluid across the orifice of a tube reduces the tension within that tube.

Under exceptional circumstances and local obstructions, there is occasionally a down draught through the pipes, which act as the long leg of the siphon system of ventilation; but this is of no moment, for the outlet being lower down and outside the building, the aërial discharge takes place there after sweeping through the drain-pipes, and is generally devoid of smell, for I find that, after a few weeks' operation with fairly laid glazed pipes, although they may have been down for years, the oxidizing effect of the continuous body of fresh air passing over the surface deposits within the pipes, entirely consumes the putrid matters. The currents, however, are generally ascendant, and deliver at the roof level. A series of observations conducted under varying conditions and localities determine the average velocity of flow at three to four lineal feet per second in calm weather, which increases to nine feet, and often twelve feet with a strong wind. And it is to this severance of the house from the sewer by the water-seal of the siphon trap, in conjunction with the sweeping air currents maintained through every drainage pipe of the house, that I depend for clean air and clean water within the building, and it is most certain in its action.

CORRESPONDENCE.

THE ACCIDENT AT THE ANCHORAGE OF THE BROOKLYN BRIDGE. — STATIONS FOR THE ELEVATED RAILROAD. — CHANGES AT THE STEWART MEMORIAL CATHEDRAL. — MISCELLANEOUS NEWS.

New York.

The New York and Brooklyn Bridge Company has just been brought in by a coroner's verdict as indirectly responsible for a loss of life by the falling of a pair of brick arches at the Brooklyn Anchorage. The construction is by a series of heavy brick arches turned between stout brick piers. The space between crowns is about eleven feet; and two of these arches had been placed in position, when the top one was felt to be settling. The men sprang to the pier-top, and were all saved but Neil Mullen, a laborer working below the lower arch, who was crushed by the bricks of the two arches; the upper one carrying down the lower in its fall. The testimony shows that in building one of the abutment-piers, a large granite skewback, weighing two tons or more, accidentally swung up against the brick pier, and gave it such a shock as to destroy the "set" of the mortar, and impair the coheiveness of the pile. This was not observed at the time, and the stone was laid, and the arches turned; and it was not until the pier was taken down after the accident, that its instability and lack of power to withstand the thrust was noted. The jury found that the accident was in some degree caused by the too early knocking-out of the centring; but Mr. C. C. Martin and George W. McNulty, the assistant engineers, placed the blame more particularly upon the weakened pier. The verdict reads: —

"It is the opinion of the jury, that had the 'centres' been allowed to remain a sufficient time to have admitted of the mortar becoming prop-

erly set, the accident might have been avoided; and they are more strongly inclined to this belief, from the testimony that one of the piers which supported the arches in question had sustained an injury during the progress of the work, which was not deemed at the time to be of a very serious character by those in charge of the work, but was, it seems to the jury, of sufficient importance to have called for greater precaution in the construction of the arches, pending the construction of the final pier or abutment, with the completion of which, in our opinion, such an accident would be impossible."

The Gilbert Elevated Railroad Company promises to do somethings creditable in the erection of the waiting-stations along the line of their rapid-transit road. Along the artery avenues, the stations span the cross streets; and a plan of one really means a treatment for all. The company have decided to use sheet-iron, and to get at the best way of doing so invited designs from a number of architects, who declined, of course, to enter into such an indefinite competition; and the company finally ordered sketches from a number of prominent architects, including Messrs. Potter & Robertson, C. F. McKim, George Harney, A. J. Bloor, and others. The Board of Directors have not yet decided which, if any, of the plans will be adopted.

Mr. Henry G. Harrison, the architect of the Stewart Memorial Cathedral at Garden City, has decided upon very radical changes in that building. The chancel has now thirteen sides, and the increased depth here, and the addition of a bay to the choir, has secured effects within and without which were painfully wanting in the first design. Work is progressing favorably, and the temporary roof is now on. The gargoyles along the cornice line and at other points have been modelled directly in the clay by Mr. Harrison, and for positive treatment are a valuable series of studies. The crypt in which the bodies of Mr. and Mrs. Stewart are to be laid will now be placed immediately below the chancel, instead of below the vestry-room. The new crypt will be a fourteen-sided room, with triple columns of various-colored marbles at each of the angles. The light will be abundant; and the white marble groining and carving, with pierced screens of the same material cutting the crypt from the Sunday-school room, promise to give a rich effect.

The Long Island Historical Society have not yet decided by the aid of which of the dozen plans submitted they will expend the eighty thousand dollars set apart for their new building. One of the competitors is from Boston, one from Philadelphia, three from Brooklyn; and the rest, some half-dozen in all, are of New York, Mr. Hatch taking no part in it. A decision will be probably reached in a few days.

There is a movement on foot to organize a book club for the purchase of works on architecture; the loaning of the volumes to be confined strictly to the members of the club. Mr. Hardenbergh is pushing the project vigorously, and the books when secured will be kept in the Institute rooms.

Gen. R. C. McCormick, the United States Commissioner to the Paris Exhibition, is much concerned about the façade which must be provided for the United States section in the main building. With the limited fund at his disposal, nothing very costly at least will be attempted. The section is between the English and Russian sections, so that by immediate comparison at least an excellent opportunity is afforded. Mr. Pettit, who was the engineer architect of the Main Building at Philadelphia in 1876, is now in Europe; and efforts are being made to summon him to Paris, that he may make and carry out a design for this façade.

The Chamber of Commerce here will make a renewed effort this winter to secure from Congress the right to purchase the old Post Office site for the erection of a new Commercial Exchange. The right to buy additional lots in the rear has been secured; and if the project is carried out, a by-street will be run along the rear to obtain light on all sides. Congress can do no more equitable thing than grant the prayer of the New York merchants.

THE NEW WORK. — UNPROFESSIONAL CONDUCT.

ST. JOHN, N.B.

A STRANGER coming to St. John now, nearly seven months after the great fire, would be surprised at the rapid progress which has been made in rebuilding the city; warehouses, stores, and dwellings have sprung up almost in a day. Dock Street where the fire began, and King Street, have been nearly restored, most of the buildings are occupied, and business is going on much as usual. In other parts of the city the work has been quite as rapid, although the tract of territory burnt being so large, the buildings are somewhat scattered. Nearly nine hundred buildings of all kinds have been erected; of these one-half are of brick, while the others are of wood, there having been as yet but one stone front put up.

Architecturally the buildings may be characterized as mediocre, and it would be difficult to find a city of the size and commercial importance of St. John in which there were not more worthy buildings. If any one is in search of a vernacular American (Canadian?) architecture, he has but to come here. One might travel for weeks and months, and then not meet their equals in point of conception. The use of galvanized iron and colored bricks has done much to assist the development of this vernacular architecture; cornices of three or four feet projection, immense gables, pediments, towers, etc., of galvanized iron, are innumerable; in fact, there seems to be no limit to the uses to which it has been put. A store on Prince William Street has on its front some ten or twelve hundred dollars worth of this stuff, when for the same amount of money it might have been neatly finished with sandstone. In passing along the street one has but to glance up at a building to see a couple of workmen placing into position an immense cornice, some twenty or thirty feet long, of what appears to be stone, but is really nothing but galvanized iron. The use of enamelled bricks has been quite as extensive as that of iron. I thought when I wrote my last, that the fever had reached its height, — but no, the *Globe* office in Prince William Street, of which Messrs. Dunham & Clarke are the architects, is the climax, or perhaps I might say anti-climax, of this architecture: as an example of polychromatic decoration it stands unexcelled. Besides stone and iron, there are used in this front red, black, buff, white, blue, and I don't know how many other colors of bricks, giving it much the appearance of a kaleidoscopic pattern.

Among the buildings begun or nearly completed, that were not mentioned in my last, are several schools and churches; of the former the rebuilt Victoria School by McKean & Fairweather is perhaps the costliest and best designed. It is of brick with sandstone flush belts and other finish, there being no projecting ornamentation from the basement to the cornice; and consists of three high stories and Mansard roof, while on the front is a tower which rises a story higher. The window-openings have pointed stone and brick arches, with a band of buff enamelled bricks carried around the extrados, detracting somewhat from the otherwise careful design. On the opposite side of Duke Street, a little farther down, is the Central Madras School, one of the several schools of the Madras School Board connected with Trinity parish; the architect is Mr. J. C. Babcock. The Roman Catholics have erected in Carmarthen Street, from the designs of M. Stead, jun., a large building called St. Malachi's Hall, to be used for school and other purposes. There is one other large building which may be classed with the schools, — the Wiggin's Male Orphan Asylum, a Church-of-England institution, richly endowed; it has been rebuilt with the addition of a Mansard roof, giving it much better accommodations. Among the churches may be mentioned St. David's, nearly completed; St. Andrew's, from the designs of Langley, Langley, & Burke of Toronto, of which the Sunday school only has been built; and the Centenary Chapel, Methodist, which has been but lately begun; it is of stone to the top of the spire, while the other churches are almost entirely of brick, and it will cost nearly one hundred thousand dollars; the architect is Mr. John Welch of New York. The Germain Street Baptist Society have their building roofed in, Dumaresq & Dewar of Halifax being the architects. Nearly all the banks will rebuild. The competition for the Bank of New Brunswick has been awarded to H. F. Starbuck of Boston; it will have two stories on Prince William Street, while on Water Street, which is some twenty and odd feet lower, there will be four stories; the dimensions are about 68 feet in the former street and 50 feet in the latter, with a depth of 90 feet. The entire Prince William Street story is used for banking purposes, with stockholders' and janitor's apartments in the second story; the lower stories on Water Street will be rented as stores. The front is that of a classic temple. The Maritime Bank began operations several weeks ago on their lot in King Street, from the plans of Hopkins & Wiley of Montreal. The other banks will probably begin in the spring, when the weather is a little more suitable for building purposes than it is at present.

In the burnt portion of the town the streets are rectangular, so that the lots would be quite easy to build upon if it were not for the dimensions, which are almost universally 40 x 100 feet, thus rendering the planning of a house quite difficult owing to the extreme length; the houses are seldom over two, or two and a half stories high, and for this reason are carried out the full length of the lot. Another difficulty is found in the unusually hilly condition of the city, making it almost impossible, except on certain streets, to build a block of more than two houses.

A number of persons here, acting and practising as architects, have taken upon themselves, besides their own legitimate business, the agency of building materials, such as tiles, enamelled bricks, sash-weights, window-fastenings, etc., while the dishonorable and unprofessional practice of receiving percentages from builders is carried on quite extensively. What with these practices and the cut-throat propensities of some members of the profession in underbidding each other for the sake of a job, architecture as a profession has sunk considerably in the estimation of the people; so that clients run from one architect to another until they find one to suit them, he being not unfrequently the cheapest.

WARRINGTON.

GERMAN PATENTS. — In the recent revision of its patent laws, the German Government has adopted some of the features of the United States patent system; among them that of publishing a periodical containing a description of recent inventions, similar to the United States Patent-Office Gazette. At the opening of the Imperial Patent Office a circular was issued explaining the plan upon which its business is to be conducted, and soliciting suggestions from other countries more conversant with the workings of the system.

THE "LOAN EXHIBITION IN AID OF THE SOCIETY OF DECORATIVE ART."

New York, Jan. 1878.

The "Loan Exhibition" held at the Academy of Design, New York, has closed with most successful pecuniary results. The throngs that have visited it during the past month have unquestionably carried away with them the memory of interesting objects in abundance and of a general *coup d'œil* of brilliant beauty. Whether they have gained much solid information as to the everlasting principles or past practices of decorative art, there is good reason to doubt. The exhibition has professed to be not only a pretty show of what could be gathered — rare, valuable, and curious — from the homes of New York, but also a temporary school of art. Claiming this, it invited criticism of a sort that would be ungracious had its claims been less high. Offering "culture" as well as gratification for the eye, the managers purposely put the price of admission very low, and invited to its rooms those who, as art students or artisans, would come for instruction in their special fields. An exhibition planned with this object, carried out consistently, and employing with discretion the treasures to which it had access, might be followed by very good results; for there is no city where more attention is paid to-day to the decorative arts, where more earnest though sometimes lamentably undirected efforts are being made to understand them and improve their practice. To be as useful as it might, such an exhibition would need to be in competent, and above all in strict hands; it would need to be most carefully arranged in some systematic way, — in sequence chronological, geographical, according to material, or according to style. It would need to be fully and instructively catalogued with reference to a rather low standpoint of knowledge of styles, periods, and handiwork. Nothing inferior should be admitted, nothing vaguely labelled, or carelessly praised. When I say that the past exhibition has not met these requirements, I mean no word of dispraise for the ladies who have expended so great an amount of time and industry, and shown such excellent taste, in its arrangement. One does not blame the exhibition for being no more than it has been, — a wonderfully attractive and "fashionable" *soirée*, a confused but eminently picturesque assemblage of interesting bric-à-brac: one only blames it for laying claim to higher merit. It was a pretty show, but in no sense of the word even a temporary "school of art."

The general effect was charming. Large quantities of tapestry and woven and embroidered hangings of all kinds were placed at the managers' disposal, and gave them a means of decoration which they used with unquestionable success. The Bric-à-brac Room, especially its farther end as seen from and framed by the door of the picture-gallery, was very beautiful. It was hard to single out any for especial admiration among the many gorgeous fabrics, yet some almost compelled particular mention. One in the corridor, a "specimen" piece of Japanese embroidery in the most brilliant patterns on a yellow ground, bore witness that no depth or height of color is illegitimate in decorative art if the hand that weaves it be cunning. Near it hung a Persian embroidery of the well-known "sacred-tree" pattern, subdued in color, and admirable for conventional grace; also two panels of gorgeous Japanese work, one of which, with birds and a mountain, could not well be surpassed for conventional treatment of landscape. It is impossible, again, to overpraise the delicate and refined art of some of the Chinese and Persian needleworked bedspreads, etc. Some of the Japanese work — notably the large and splendid "Japanese Poet's Hanging," — exhibited the effects possible of production with massive gold lines to accentuate the design. An interesting piece of French tapestry marked A.D. 1500 would have justified an earlier date, and was in excellent preservation, characteristic and beautiful. But even this, how far inferior to Oriental work! Its color was harmonious through reserve; while in Asiatic work the coloring has the higher beauty of being harmonious in spite of — because of — the most daring brilliancy. To the specimens of modern work after good models sent by Messrs. Herter I give high praise when I say that their close contact with Oriental work did not desolorize and spoil them. On the other hand, there were some hangings with quasi-Oriental designs, the property of a New York artist, that were clever enough as amateur work, but hardly seen to advantage amid their masterly surroundings, and by no means entitled to hang as samples of what decorative art should be.

The furniture in the Mediæval Room was not very remarkable and was carelessly labelled. The most striking object was a Spanish cabinet in gilt-wood and velvet, attributed to the fifteenth century, and very probably of that age, as it seemed to show no traces of the Renaissance. It was more showy than artistic, except in the metal-work of the hinges, etc., and had evidently been regilt and painted at no very distant day. Near it were two very fine chairs which might teach the apostles of the present furniture reform that they have not yet exhausted all the good shapes. In the Bric-à-brac Room, were two more chairs, one in ivory from Delhi said to be six hundred years old. It should have been noted that its ugly covering was a very modern addition. The other, marked "Louis Quinze," was by no means that, but "Louis Seize" or "Empire," and its needlework, I should think, of the present century.

Passing now to the cabinets of the Bric-à-brac Room, we find that their contents were arranged with inimitable grace and effectiveness. But effect had been too exclusively sought, and the articles were not so well arranged, for the purposes of study, as they might have been. As with the hangings, Persian, Chinese, Japanese, modern, mediæval, and Renaissance were inextricably mixed, and study of them almost impossible, so here, pottery of all times and climes, metal, jewelled, and enamelled works, were picturesquely huddled together. The pottery was not very good, but might have been moderatively instructive, had one not been obliged to hunt through many cases, and peer into many remote shelf-corners, to be sure whether or no a wished-for specimen was to be found. Those who knew little of styles and specimens, and had no wish to find any particular thing, merely a desire for general information, must have been rather hopelessly bewildered. Several articles claimed to be "Chinese Imperial Yellow," which such a critic might doubt. If they really are believed to be genuine, their pedigree should at least be shown. Of course there were most exquisite specimens of Satsuma, Kioto, and other Oriental wares; but I did not find a single piece of Persian pottery, — perhaps, if we except the best Greek art, the most perfect product that has ever left the wheel. Various examples of majolica proved how entirely the value of Italian earthen-ware depends on painting as distinguished from modelling. To the artist it was absolutely of no moment whether or not a certain *grès* jug "came over in the Mayflower," as it was said to have done. It was in any case a sample of true and excellent art, as well as a fine specimen of the combined use of the only three colors — brown, gray, and cobalt — used in this ware. Just what was meant by a label reading "Henri Deux faience ewer, reproduction, eighteenth century," it is hard to say. It was copied from the Oiron pottery, doubtless, though merely painted, not inlaid; but it is new to hear of any reproduction of that ware dating from the last century. In pottery one found also good examples of M. Solon's art. Undeniably beautiful though it is, has it not been almost overpraised of late?

It must be to many lovers of art a matter of regret that the distinction between a work of art *per se* and decorative work of however fine a grade is so often lost sight of. It is very well to hang, even to frame, fine Capo di Monte reliefs, or the masterly paintings of old majolica; but clever modern plaques, with broad contours and flat tints, like some of Deck's here shown, are, no matter what their correctness of line or harmony of color, decorative merely, and should find their place in the doors of a buffet or the panels of a wainscot, not in frames for independent effect.

In gold and silver work there were some very pretty specimens, especially of the Queen Anne and rococo styles, a few fine Oriental and antique examples, and some characteristic Scandinavian and Russian handiwork. A few samples of contemporary work by Kirke and Tiffany seemed inferior to the older art in both vigor and delicacy of touch. In the Mediæval Room was some good Italian work in copper and *repoussé* brass, and one of the most beautiful objects in the whole collection, — a Byzantine crucifix. The pictures which filled the large north room were not — with a few exceptions — of great excellence. They were chiefly remarkable as expressing the fashion of the day; almost all the artists represented ranking as first favorites with our public.

More interesting than any of these must have been, to the architect, the little specimens of window-glass, rather too often at variance with their printed descriptions, but giving some interesting consecutive examples. The best piece was a circular compartment in the first style of mediæval work, catalogued as "very old," and as representing the "Byzantine eagle." Whatever may represent that bird, this medallion certainly does not; for it showed a straight-beaked bird, with its bill open and wings flapping in the midst of flames, — perhaps a phœnix? From the architectural details of the background, this harmonious brilliancy and depth of color, this little gem may very easily date back to the twelfth century. Another bit of later work, "Angel Playing Chimes," was most beautiful. Two pieces attributed to Dürer should rather have been called "painted" than "stained glass," and should by no means have been noted as the "highest style of mediæval art." "Mediæval" art was done with in Dürer's time, and with it the best days of glass. Some of the bits from Mr. Prime's collection were better than others; but all were very late work, fussy and inappropriate. For bold, clever, and simple leading, for what the Germans call "style-ful" conventionalizing of the subject to suit the material, and for depth and perfection of color, we must go back to the two earliest specimens.

A word in conclusion as to the unusual crowds that have visited the exhibition. The final report has not yet been made; but I believe the number of entrance-fees received in about six weeks has been not less than forty thousand, — almost a thousand a day. On "pay-days" the Metropolitan Museum is practically unvisited, though the price is no higher — including admittance to the Castellani Collection — than at the Academy, and the objects of interest — need I say it? — a hundredfold more beautiful and instructive. One can hardly help drawing the rather painful deduction, that fashion, more than the love of art pure and simple, has made the "Loan Exhibition" so popular, and that the true beauty of porcelain and "Venice point" has been less apparent to many visitors than the fact that they were looking at Mrs. A's plates or Mrs.

B's laces. It is for this very reason,— because with us any thing stamped with the *cachet* of "society" becomes at once so prominent,—that it is doubly necessary for enthusiastic and self-sacrificing amateurs, when they desire to assist the art-education of the nation, to go about their work not only with zeal, devotion, and liberality, but with prudence and wise severity, and with the assistance of the best professional experience and the widest professional culture. M. G. VAN RENSSELAER.

PERSONAL CORRESPONDENCE.

THE following letters need no comment from us: —

LOUISVILLE, KY., Jan. 12, 1878.

EDITOR ARCHITECT AND BUILDING NEWS.

Dear Sir, — I enclose herewith a communication I received yesterday.

I think the writer is entitled to the legitimate benefit of this character of enterprise, and hope as his just due you will publish his communication. Yours, etc.,

H. P. MCDONALD.

CLEVELAND, O., Jan. 8, 1878.

HENRY P. MCDONALD, ESQ., LOUISVILLE, KY.

Dear Sir, — Will you be kind enough to inform me whether the workhouse of which you are the architect is to be heated with steam, and, if so, who has the contract for same? I manufacture direct and indirect radiators, and claim, especially for indirect radiator, that I furnish from twenty-five to forty per cent more heating-surface for same money than can be had with any other pattern. What I want, of course, is to sell the radiators for this job, if any are to be used; and, if you can *aid* me to that end, I shall be very glad to *acknowledge* your assistance. My radiators are now going into a new Court House at Newark, O. Both the direct and indirect have been used very largely for past three years, and give very best satisfaction. I should be glad to hear from you with any information you may have. Very respectfully,

T. H. BROOKS.

COMPETITIONS IN INTERIOR DECORATION.

THE editors propose to institute a series of competitions, of which the first subjects will be in interior decoration, upon programmes proposed by themselves; and prizes have been assigned by the publishers, subject to the following regulations: —

1. The programmes will be published in the columns of the paper at least four weeks before the reproduction of the drawings selected for publication. These drawings will be grouped on the page, and will form one of the regular illustrated pages, as often as once a month, — oftener, if the number and excellence of the designs warrant.

2. A first and second prize will be awarded to the best two designs submitted in each competition; the decision resting with a jury of three architects.

3. Each competitor is requested to sign his drawing by a motto or device, and to enclose to the editors his name and address.

4. The designs to which have been awarded the prizes will be announced in the *American Architect*; the authors of the designs being indicated by their devices or mottoes only. The real names of the authors of prize designs will be published at the close of the year.

5. Only those designs which in the eyes of the editors are worthy will be published. The order of the publication of the designs is to be taken as in no way indicative of the decision of the jury.

6. Drawings which are received after the day named in the respective programmes will be thereby excluded from the competition, but not necessarily from publication.

7. In awarding the prizes, heed will be taken of the manner in which the programme has been followed, the excellence and appropriateness of the design, and the execution of the drawing.

8. Drawings may be sent flat or in rolls, by express or by mail. They will be returned to their authors at the close of each competition.

9. The limits of the drawings must in no case exceed 16½ inches in length by 10½ inches in breadth. This space is to be enclosed by a single line only by way of a frame.

10. For instructions as to the manner of preparing drawings for reproduction, competitors are referred to the instructions which are regularly printed on p. viii. or ix. of the advertising pages.

The first prize will be: —

ART FOLIAGE FOR SCULPTURE AND DECORATION, with an analysis of geometric form, and studies from nature of buds, leaves, flowers, and fruit. By James K. Colling, F.R.I.B.A. 72 plates. 1 vol. large 4to $15

OR, EXAMPLES OF ENGLISH MEDIÆVAL FOLIAGE AND COLORED DECORATION, taken from buildings of the twelfth to the fifteenth century, with descriptive letter-press. By James K. Colling, F.R.I.B.A. 76 plates and many woodcuts. 1 vol. large 4to $15

OR, GOTHIC FORMS, applied to furniture, metal-work, and decoration for domestic purposes. 31 plates. By B. J. Talbert, architect, London. 1 vol. folio $15

The second prize will be: —

THE STORY OF A HOUSE. Translated from the French of M. Viollet-le-Duc, by George M. Towle. Illustrated by the author. 1 vol. 8vo, bevelled boards, red edges $5

OR, HABITATIONS OF MAN IN ALL AGES. Translated from the French of M. Viollet-le-Duc by Benjamin Bucknall, architect. Fully illustrated. 1 vol. 8vo $5

OR, ANNALS OF A FORTRESS. Translated from the French of M. Viollet-le-Duc by Benjamin Bucknall, architect. 85 illustrations, several in color. 1 vol. 8vo $5

COMPETITION NO. 1. — A WOODEN STAIRCASE.

The subject of the first competition is a wooden staircase in the dwelling-house of a person of means. It is to be contained within the walls of an entrance-hall which is 16 feet wide, and is lighted by a window at the end. The height of the story is 13½ feet from floor to floor. The drawings required are the plan, elevation (or section), and details to a larger scale than the principal drawings; in addition to these the designer may at his option exhibit the arrangement by a perspective sketch. All these drawings must be included on the sheet whose dimensions are given above. Drawings must be received at the office of the *American Architect and Building News* on or before Feb. 26, 1878.

NOTES AND CLIPPINGS.

THE ILLINOIS STATE HOUSE. — Work on the new State House has entirely ceased, as the amount limited by the constitution ($3,500,000) has been expended, and about $750,000 more will be required to finish the structure. The last General Assembly made an appropriation of $38,000 for repairs, which amount was used in finishing the dome. At the November election a proposition was submitted to the people to appropriate $500,000 for completing the new State House, which was rejected by an overwhelming majority. The building will stand in its unfinished condition for at least ten years before the people of Illinois are ready to expend any more money for this purpose.

ALMOST AN ACCIDENT. — While the vestry of Trinity Methodist Church at Springfield, Mass., was densely crowded at the Murphy temperance prayer-meeting on Jan. 16, it was observed that the floor was settling in one corner; the people in that part of the room were quietly advised to leave, and a panic was thus averted. An examination showed that one of the brick piers supporting the building had been badly cracked by the great weight upon it, and it is thought that the discovery was made just in time to prevent disaster.

BUILDING ACCIDENTS. — While an old building in Providence, R.I., was being pulled down on Jan. 16, numbers of poor people busied themselves in carrying off the refuse sticks and chips, and in spite of the efforts of the police several of them succeeded in getting into the building, where one of them, George Wight by name, pulled out an important stanchion, and immediately the already enfeebled structure fell, and buried the unlucky author of the mishap and four others. Wight was thought to be mortally injured, and all the others are seriously hurt.

A two-story frame house erecting on Bush, near Court Street, Brooklyn, N.Y., fell Saturday evening, Jan. 19. It belonged to Louis Blennell: his loss was $600.

Three Congregational churches of Deer Isle, Me., were blown down by the gale a few days ago.

THE CHIMES OF ST. MARK'S, PHILADELPHIA. — The Supreme Court has made an order, granting the modification asked on the part of St. Mark's Church for a modification of the decree in the case, with these exceptions, — leave to ring the chimes on every day that had a full service, at all daily services for not more than five minutes, nor earlier than nine, A.M., nor later than eight, P.M., and at Sunday-school services for five minutes, not earlier than nine, A.M., was refused. The modification allowed permits the chimes to be rung on the following days, in addition to the times mentioned in the decree: Washington's Birthday, Fourth of July, New Year's Day, Epiphany, Ash Wednesday, Good Friday, Ascension Day, All-Saints' Day, Thanksgiving Day, Christmas Day, and at weddings and funerals.

THE INFLAMMABILITY OF FLOUR DUST. — An atmosphere surcharged with particles of fine flour is certainly highly inflammable, if not explosive. A week or so ago, the workmen employed in one of the largest flour-mills in Minneapolis, Minn., saw a volume of flame coursing through what is known as the blast-box, a conductor used in carrying fine dust from the burs to the open air. The workmen seized a number of fire-extinguishers, and without excitement or confusion brought the flames under control, but not till the woodwork of the long box had been charred from end to end. The explanation of the origin of this fire is quite simple. The foreman conjectures that one of the burs was revolving without feed, and while the upper stone was raised as usual, a nail or fragment of lime emitted a spark which was enough to ignite the fine dust which was carried through the blast-box. It will not be forgotten that the destruction of the candy-factory in Barclay Street has been ascribed to explosive vapors generated in the process of manufacture of gum-drops; and, moreover, that two of the workmen have stated that a lamp was upset on one of the upper floors where powdered starch was stored. Amongst other substances which become highly explosive when reduced to a finely-divided condition, is said to be cork.

FIRES IN SAN FRANCISCO IN 1877. — The total loss for the year 1877 was $867,990.08, and the total insurance on property destroyed, $2,098,679.02.

A Remarkable American Clock.—In Mengel's building is now on exhibition in all probability the most wonderful clock in the world. It was built by Stephen D. Engle, a watchmaker, at Hazleton. He is about forty-five years of age, and was about twenty years in perfecting the clock. Mr. Reid paid Engle $5,000 for it. Engle never saw the Strasburg clock: in fact, he has not travelled more than two hundred miles from home at any time. The clock stands eleven feet high. At its base it is about four feet wide, and at the top about two. It is about three feet deep at the base, gradually less toward the top. Its colors are dark brown and gold. The Strasburg clock is thirty feet high, yet its mechanism is not so intricate nor has it as many figures as the Hazleton clock. The Strasburg clock's figures are about three feet high, and the American clock about nine inches. Three minutes before the hour a pipe organ inside the clock plays an anthem. It has five tunes. Bells are then rung, and when the hour is struck, double doors in an alcove open, and a figure of Jesus appears. Double doors to the left then open, and the apostles slowly appear, one by one, in procession. As they appear and pass Jesus they turn toward him, Jesus bows, the apostle turns again, and proceeds through the double doors in an alcove on the right. As Peter approaches, Satan looks out of a window above, and tempts him. Five times the Devil appears; and when Peter passes, denying Christ, the cock flaps its wings and crows. When Judas appears, Satan comes down from his window, and follows Judas out in the procession, and then goes back up to his place to watch Judas, appearing on both sides. As the procession has passed, Judas and the three Marys disappear, and the doors are closed. The scene can be repeated seven times in an hour if necessary, and the natural motion of the clock produces it four times an hour, whereas the Strasburg procession is made but once a day,—at twelve o'clock. Below the piazza is the main dial, about thirteen inches in diameter. To its right is a figure of Time, with an hour-glass. Above this is a window, at which appear figures representing Youth, Manhood, and Old Age. To the left of the dial is a skeleton representing Death. When the hour hand approaches the first quarter, Time reverses his hour-glass and strikes one on a bell with his scythe, when another bell inside responds; then Childhood appears instantly. When the hour hand approaches the second quarter or half hour, there are heard the strokes of two bells. Then Youth appears, and the organ plays a hymn. After this, Time strikes two and reverses the hour-glass, when two bells respond inside. One minute after this a chime of bells is heard, when a folding door opens in the upper porch, and one at the right of the court, when the Saviour comes walking out. Then the apostles appear in procession. The clock also tells of the moon's changes, the tides, the seasons, days and day of the month and year, and the signs of the zodiac; and on top a soldier in armor is constantly on guard, walking back and forward. As the hours advance, Manhood, Old Age, and Death take part in the panorama.—*Reading (Penn.) Eagle.*

Rain-Water Cistern.—A Charleston (S. C.) gentleman says of the cisterns in that city,—

"We are almost entirely dependent upon our cisterns for drinking-purposes, more than three-fourths of the population being supplied with water in that way. Great care is therefore taken in the construction of our reservoirs. They are built of brick laid in cement (no lime), and plastered inside and outside with the same. Within there is a double partition, from floor to ceiling, of brick laid in cement; and the space within this double wall (say six inches in width) is filled with fresh-water gravel. This wall is built in one of the corners of the cistern in a semicircle, and the pipe for the pump inserted in the enclosed space. The water is filtered through this wall, and is as pure as crystal. A little charcoal is sometimes thrown into the cistern. You will see, that, by allowing the roof and gutters to be thoroughly washed by the rain before letting water into the cistern, you get rid of all impurities; and, if the cistern is sufficiently large, only the fall and winter rains should be taken in. The impurities that float in the air during spring and summer are thus prevented from getting in. This is not always done, although it is desirable."

Refrigerating Apparatus.—A description of a simple contrivance for the rapid cooling of liquids, invented by M. Tosell, is described in *Les Mondes*. It consists of a cylindrical cup, for holding any liquid, into which may be plunged an inner goblet, shaped like an inverted truncated cone, and having a lid which rests on the outer cup. Putting 65 grammes of nitrate of ammonia in the inner goblet, filling it with cold water, and stirring it so as to hasten the solution, the temperature of the outer liquid is seen reduced at least 12° C. (22° Fah.) The salt may be used for an indefinite period, by spreading it on a plate after each trial, and exposing it to the sun until it crystallizes anew. The inventor prepares a salt which will lower the temperature 23° C. (50° Fah.), in the warmest countries.

Talc and its Uses.—The hydrated silicate of magnesium known as talc occurs in foliated masses, has a soapy feeling, is fibrous, but not elastic. Large beds of this mineral are found in various sections of this country. It is quarried, broken into small pieces and ground by means of attrition mills, and bolted like flour. It is used in the manufacture of writing-paper,—fifty per cent of the mineral with fifty per cent of cotton making a fine paper. Being, like asbestos, fire-proof, it is used largely in the manufacture of roofing-paper.

Poisonous Wall Papers.—Mr. Seebold, of Manchester, England, has analyzed not less than 60 or 70 kinds of paper for covering walls, and has found that 10 only were harmless, although the colors were not green, but pink, blue, red, brown, etc.

The Churches of England.—It is said that the Church of England has 16,000 religious edifices, including 30 cathedrals, 16,000 glebe houses, 31 episcopal palaces, and 1,000,000 acres of land, much of it in good condition for tillage.

Drapers as Building Contractors.—That the present is an age of development is evident, and the results are seen on every hand. For one thing, we have seen how the tailor has passed from his original trade through that of ecclesiastical furnisher to church decorator-in-general, dealing largely in works of iron, glass, wood, and stone, and even executing some of the most important castings in bronze that the time affords. And, again, one has seen how the dealer in paper-hangings has developed into professional decorator, charging fees, and taking a leading part in a demonstration against the architectural profession, his original employers. These we have seen, and more; but nothing probably is more strikingly novel than the fact now before us in the matter of the Congress Hall at present building at Croydon for the church meeting in that town next week. The work is proceeding in the usual way under the direction of an architect (Mr. Salter, of London); but, strange to relate, although tenders were offered by eminent builders, the contract has been taken by a fashionable West-end *draper*, who not only is building the hall, but has undertaken to supply the finishings and furnishings, besides the refreshments which will be required for the congress. If these details are correct, we can only remark that the character of the procedure is novel, and we were not surprised to observe the dilatory manner in which the men were working as we passed the building a day or two since. For the sake of the church people it is perhaps a good thing they have got the supervision of an architect. The hall, we understand, is costing about £4,000.—*Building News.*

The Difference between a Legal and a Sentimental Nuisance. The English chancery judges have recently drawn the line between a legal nuisance and a sentimental grievance. A man in Brighton built a house so as unintentionally to deprive a neighbor of the use of his best bedroom. This room had a bay-window, and the indiscreet neighbor had built his house on such a plan that some of its rooms commanded a full view of this window at a distance of seventeen feet. Ladies could not use the room, and the hospitable owner of the dwelling could not entertain his friends. He brought a suit against the owner of the new mansion as the author of a public nuisance, and the case finally was laid before the chancery judges. But the bench decided that there was only one test of a legal nuisance: Was it injurious to the health of the complainant, or did it interfere materially with the passage of light and air? If not, it was only a sentimental nuisance, and damages could not be claimed.

Moistening Hot Air in Rooms.—An effective contrivance has been devised, says the New York *Tribune*, for overcoming the dryness of the air in heated rooms. It is called an "air moistener," and is of additional service by arresting the dust that comes up through hot-air flues. The device consists of a series of pans set in a frame. Each pan has an outlet tube which rises from the bottom to a height less than that of the sides of the pan. Consequently water poured into the top pan overflows through the outlet tube, and fills the pan below it, and so on, through the series. At the top of the frame there is a chamber of just sufficient capacity to hold water enough to fill all the pans; this is filled first; then its outlet-valve is opened, the pans fill, and the contrivance is ready for operation. The frame is to be hooked on in front of hot-air registers or set on top of a stove or furnace. The quantity of water evaporated is large, and the apparatus needs to be filled at least once a day; but where it is inserted in cellar furnaces the filling can be made automatic by connection with the water-supply.

The Niobe on Mount Sipylus.—The Niobe on Mount Sipylus, which is mentioned in the Iliad, is a rude effigy in the valley of the Hermus, near Magnesia. The figure is on the perpendicular face of a rocky cliff which has been hollowed out behind into a niche. A correspondent of the *Daily News*, who visited the valley last spring, and climbed up the heights to make a sketch of the Niobe, is confident that the figure is the result of human labor, and not carved by the hand of Nature. Some of the fingers can still be traced, but not a feature of the face can be distinguished. The effigy is in a sitting position, with the rude representation of a chair. The figure seems to have been well known to the old Greek writers, for a reference to it will be found in the "Antigone" of Sophocles: "I have heard that by a most mournful fate, perished on the promontory of Sipylus the Phrygian stranger, daughter of Tantalus. Her, like the clinging ivy, did the shoots of rock subdue; and her, dissolving away in showers, as the legends of mortals tell, the snow never leaves; and from her eyes, that ever flow with tears, she bedews the cliffs."

How a Water-Pipe may be Cleaned.—A correspondent of the *Forest and Stream* gives a novel method employed to cleanse a two-inch water-pipe which had become choked with mud. A string was passed through a hole punched in the tail of a small eel which was straightway put into the pipe. An occasional jerk reminded the eel that it was incumbent on him to progress, which he did, arriving at the lower end of the pipe with the string. A bunch of rags was tied to the string, and thus the pipe was cleansed.

Utilizing Railroad Sinks.—The *Railway World* says that the Southern and Eastern railroad companies, of France, have recently acted upon a suggestion of the Lyons Geographical Society, and added to the names of their stations statistics concerning the geographical position, elevation above the sea-level, population, industries, etc., of the towns wherein they are located. To further popularize geographical knowledge, some towns have also erected stone pillars, upon which are placed various meteorological instruments, maps of the town and environs, the bearings and distances of the capitals of Europe, the places of interest in the neighborhood, and other information.

A Baptist Chapel is to be built at Athens, Greece. Subscriptions are being made in Boston and New York in its behalf.

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AT the very end of the last year Italy lost the most distinguished of her recent architects — almost the only one who had achieved a European reputation — by a death as startling as his career had been brilliant. All travellers who have visited Milan within the last ten years remember the famous gallery or passage named after the late king, the *Galleria Vittorio Emanuele*, the work of the architect Giuseppe Mengoni. It was the most splendid work of modern architecture in Milan, and the finest passage in Europe. Finished to all intents in 1867, it was but a part of a grand scheme of the architect for renovating and embellishing the chief square of the city, — the *Piazza del Duomo*, out of the middle of which rises the cathedral. The carrying out of this scheme, which languished during some years, has lately been quickened, and the entrance façade through which the gallery opens upon the square, which had been left unbuilt, was taken up last year. The work had been so vigorously pressed, that it was substantially done, a day for its dedication was fixed, and the principal staging removed, leaving only a light temporary scaffold from which to give the last touch to the work. On the 30th of December, just ten days before the death of the king in whose name the gallery was dedicated, Mengoni went upon the scaffold to examine some detail which workmen were adjusting upon the cornice of the façade. He was seen to tread upon a loose board, which yielded under him; to fall, clutching vainly at the scaffold; and in a moment lay dead at the foot of his great work.

MENGONI was a man of great energy, in the very prime of his powers, being only forty-five years old; and his death is felt as a public calamity. The city of Milan honored him with a public funeral. He left a number of works which had given him reputation, among them the Savings Bank, and the arcades of the cemetery or *Campo Santo*, at Bologna. The gallery at Milan was on a far more ambitious scale than any that had been built before it. It is two covered passages or streets, crossing each other at right angles, and penetrating one of the blocks, surrounded by four thoroughfares, which border on the Piazza. The greatest length is 630 feet: the passages are nearly fifty feet wide and eighty-five high, roofed with iron and glass, and intersect in an octagon, the dome of which is a hundred and sixty feet above the pavement. The buildings which line them are of fine sandstone, the handsomest in the city, containing shops below, and if we remember rightly, apartments above; the whole designed with breadth and richness, and showing in its detail unmistakable marks of French influence; the first modern Italian work perhaps in which that influence was notable. The treatment of the Piazza according to his great project was still unfinished; but the fame of it had brought him commissions from all sides, even from out of Italy, so that his hands were full of designs. He had prepared among other things a project for a group of covered bazaars at Rome, and for a great mercantile building in the Stephan's Platz or Square of the Cathedral at Vienna.

THE coroner's inquest on the fall of the Tariffville bridge will doubtless be finished before this is printed; but at present the course of the testimony seems to wander vaguely enough about the points at issue. On reading the accounts of it, one is struck by the neglect of some of the main questions, — for instance, whether the bridge was properly constructed in the first place, and whether it had been properly watched since; most of the attention having been given to the question how the accident happened, which is important only for its bearing on the first two. The testimony is somewhat remarkable in showing a common fogginess as to the construction of bridges, not only in those who have charge of them but in those who construct them. The superintendent of the road was not afraid to testify under oath that he knew that a bridge of like strength never failed before under a similar weight. One bridge-builder gave his opinion, which we may sincerely hope is not justified, that the bridge is heavier in iron and timbers than nine-tenths of the bridges in New England. The iron, he thought, could not have had more than 18,000 pounds per square inch to carry, and he could not see how it should have given way, unless the train left the track. He considered the wood strong enough to have borne three times the weight then put upon it. The road-master of another road testified that all the suspension rods which gave way were broken through the screw-threads (which would seem to show that they broke not on account of flaws, but because they were over-strained), and computing the weight on the rods at not over 23,500 pounds to the square inch, "which was much less than they were warranted for," he could not see why the bridge gave way. A civil engineer testified that the iron and timber were heavier than is used in most bridges, and he thought that if one of the three suspension rods in a panel had broken, the other two would have been enough to carry the load.

ALL these things point to a condition of dangerous ignorance in people who build bridges and those who use them. It looks as if they really believed that it is safe to warrant building-materials, and to load them, up to what the tests show to be their breaking weight. If these are a fair specimen of the ideas current among railroad men, — and we do not know why they should be exceptional, — we may expect a plentiful supply of such accidents as those of Ashtabula and Tariffville in the next few years. The question, which has been much discussed, whether the train left the rails in the Tariffville case, is interesting only as a matter of detail, showing whether there was an extraordinary shock or not. If it were proved that it did not, it would show clearly that the bridge was weak: otherwise it leaves the question of its sufficiency untouched. But it is perfectly easy to show by examination and computation whether the construction was proper; and it is pretty sure that it was not. The letter to the *Hartford Courant*, which we copy in another column, gives the only intelligent account we have seen of the structure. We have not verified Mr. Merriman's computations, with which other published, but probably less careful figures, agree sufficiently well, but we have no doubt of their accuracy; and they show what we suggested in our last number, that the iron at least was loaded with double the weight which would have been put upon it by a prudent engineer. We do not see that his censure of the railroad company or of the commissioners is any more severe than the occasion warrants.

THE lesson of the accident in the New York Post Office last year is apparently not lost upon the people who live in or near it; for there has been great alarm lately over the settlement of partitions in the upper stories of the building, and the repairs to which they have led. The money-order department on the Broadway front is a room a hundred feet long, over which are a number of smaller rooms, with brick partitions between carried on iron beams. It is a year and a half since horizontal cracks were noticed near the tops of these partitions, indicating settlement in the beams; and although, being tested by strips of paper pasted over them, the cracks, it is said, have shown no considerable increase, it has been decided to strengthen the partitions by trussing; and for this reason the rooms have been cleared, to the public alarm. The reason given for the strengthening process is not very

much to the point: viz., that it may be necessary at some time to put greater weight in the upper rooms, — safes for instance: since the additional weight must come, not on the partitions, but on the floors, which are doubtless framed independently of them. It does not appear that the settlement has been of a kind to indicate serious injury to the building. Nevertheless the whole fortune of the New York Post Office enforces the lesson that the kind of construction there adopted — the carrying of long and high brick partitions on iron beams — is one to be employed with great caution; because such beams, heavily loaded, are apt to take a permanent "set," and there are no data for determining under what circumstances and to what degree this set is likely to increase constantly in a long period of years; so that, considering the uncertainty of the ordinary qualities of iron, it is necessary to allow a very large factor of safety. There is, in fact, with the late improvements in the manufacture of concretes and terra-cotta, no longer any need of building partitions in fireproof buildings of such heavy materials as have been used.

The recent establishment of a Builders' Exchange in Cincinnati, and the consequent increase of concert among the building trades, have led among other things, as we have reported, to a proposition to abolish the system of general contracts, and substitute the practice of letting out every kind of work in a building in a separate and independent contract directly to the man who is to do it. This resolution is sustained by a law that has been passed to regulate the conduct of public buildings, and there is consequently at this moment, or has just been, some confusion over a public building, which the authorities wished to let out "in the lump," unaware of the prohibition which exists. There is no doubt that the habit of giving out general contracts leads, where competition is keen, to a good many abuses. It brings a great pressure on sub-contractors from bidders who wish to take work cheaply, and subjects them to risk of loss when these bidders prove unsound. It commonly requires two profits instead of one, between the owner and the mechanic who fulfils the sub-contract, and therefore either increases the owner's expense or diminishes the mechanic's profit. In large works it makes the separate contracts amount to great sums, and so increases the risk to the employer. It makes it, moreover, more difficult to follow up and fairly compare the different estimates, or to make the most advantageous combination of them. These things are so important in public works, where the cost is generally large, and the work itself complex, where, moreover, it is difficult to make any exceptions among contractors, who, whatever their habits of work, must stand equally before the authorities, — that the contracts are practically always subdivided. But in private building, unless on a very large scale, there is so much advantage in the directness of responsibility and ease of superintendence due to having one contractor, whose duty it is to see that all things work together, that there is, and perhaps always will be, a very common preference for him; especially as the greater freedom of choice will always enable an employer who wishes to be on the safe side to choose his builder securely if he will. It is a matter, on the whole, to be best settled by the growth of a natural usage: we doubt the wisdom of attempting to regulate it by legislative enactment or by a rigid rule of practice.

Mr. Samuel Huggins writes to the *Builder* to propose a remarkable and ingenious way of building church spires. He would set in the axis of his spire a wrought-iron rod, or post, carrying a cast-iron finial; to the top of this he would attach iron chains, which should form the ribs or arrises of the spire, — four or eight as the case might be, — and anchor them at the bottom into the masonry at the top of his tower. The spire should be completed by hanging between these chains successive courses of perforated and decorated bands, of iron we presume, which would give an effect analogous to an open-work mediæval spire. The chains could be wrought in any shape "from a simple bead-form to one richly moulded and twined with flowers, leaves, and tendrils." "A spire so constructed," he says, "would be equal in effect to a completely pierced one of stone, — a nervous, well-relieved, vigorous structure, worthy of association with any composition, Gothic or classic." Nervous, we should say, decidedly; but not vigorous, unless by dint of a vigor in the designer which overpowered the essential expression of his construction; nor do we see to what known architectural style Mr. Huggins's "catenary spire" could kindly ally itself. It is perhaps not likely that in the face of English traditions any thing so radical will find favor, but if the projector were an American we should certainly expect to see it carried out here; and although he manfully rejects any idea of shamming a stone spire, — upholding his invention on its own merits, — we fear that is precisely the form in which the contrivance would show itself in Yankee-land. No doubt the use of iron has many a new form in architectural design waiting for us; and it may as it grows distinctly modify our ideas of style. The catenary curve, too, is one that we have before this heard suggested as the outline of a spire, though it is much less expressive, to our mind, than a straight line, of the incomparable *élan* of a Gothic spire. But iron, like every other material, will doubtless win its way and mould its shapes in features which its own qualities suggest. We should prefer to see every tub on its own bottom, and should hardly take kindly to the prospect of seeing our stone spires mocked by bunches of festoons, even if we agreed with Mr. Huggins in saying, "Pierce a spire, and you become the rival of the fairies, and impart to it a ghostly, ethereal air, than which nothing can be more highly becoming in a structure of its character and office."

THE LABOR TROUBLES. — II.

Class Organization.

The outlook upon the world of labor is just now especially gloomy. This is not so much because it is full of troubles — for it has always been full of troubles — as because these troubles, which used to be the isolated quarrels of one set of workmen with their employers, are nowadays gathering into combined struggles which overspread whole communities, and threaten even to involve nations. The same union among workmen which widens their strikes makes them more bitter and prolonged, more mischievous in the present and more dangerous in the future. Every struggle teaches the workmen more and more the possibility of extended combinations among themselves, and the necessity of them if they are to carry out their policy of dictating by arbitrary compulsion the condition of the labor-markets of the world. Within the past year the ship-building business in the north of Great Britain has been kept in disorder for many months, and finally brought to a condition which threatens permanent decline, by the continued strikes of the shipwrights. The iron-manufacturers of the kingdom, already somewhat crippled by the recent rivalry of other countries, — notably of our own, — have been seriously injured by the attacks made on them by their own operatives; the obstinate strikes of carpenters and masons, not yet ended, have disorganized the English building-trades, and in London itself have brought the work of building to a stand-still, interrupting the greatest public works of the day, thrusting thousands of workmen out of employment, compelling millions of capital to lie idle, and inflicting heavy loss upon a large part of the community. In our own country the chief industry of Massachusetts is at this moment crippled by a sudden revolt of the Crispin order of shoemakers, which, there is reason to believe, may work it irreparable mischief. The strike of the engineers, that last summer paralyzed for a time the intercommunication of the nation, and roused the proletariat of Pennsylvania into riots which it took the army of the United States to suppress, has hardly passed out of mind when we find the working-men of San Francisco rising to drive into the sea or burn in their houses a large body of rivals, and defying the civil authorities in threatening meetings, which clamor to Congress for class legislation, and menace with violence and plunder those who oppose their demands.

It is not our intention at this point to discuss the rights and wrongs of the aims of the unions that control these movements, — although, whatever sympathy we may have for some of their objects, it is somewhat difficult to refrain from speaking in blame of their measures, — but only to call attention to the importance of them, to remind our readers how great a factor the labor-unions aim to be and may become in politics

and society, and how vital are the questions which they propose, — questions that are passed by at present in the conflict of other interests, but may at any time be thrust forward in a way that will make them of the utmost moment.

The immediate injury which results from the warfare of workmen in disorganizing industry, and waste of means, is patent enough, though it seems as if only people who are concerned with the employment of labor had as yet time to notice it. The broader secondary results are now beginning to be felt in the absolute decay with which it menaces some of the chief industries of the day. Apparently, if the present temper of working-men continues, we may expect that every productive industry known to civilization must, as soon as it becomes prominent enough to be the occasion of a quarrel, be thrown into disorder and its progress checked by strikes. So that while we are plaming ourselves on our present century as an age of ceaseless national progress and mechanical development, there has been growing up with it an influence which threatens by dint of wilful obstructiveness to blight it at every turn, as the worm follows the growth of the orchard, or rot the introduction of the potato.

The thing which has distinguished the recent strikes, and given them weight as indications of what we may look for in the future, is the breadth of the interests they involve, and the alliances they have led to, as much as the determination they have shown and in some cases the extremities to which they have led. The Brotherhood of Locomotive Engineers last summer threatened to interrupt the whole traffic of the United States. The Crispins in Massachusetts are at this moment appealing for support to their fellows throughout the country, and contributions are made to them by many sympathizers outside their order. The striking trades in England are drawing aid from various parts of the kingdom; and the efforts of the masters to import foreign men have led the workmen to employ emissaries through the United States and Canada, as well as in Continental cities, to counteract by timely representation the inducements of the employers. The International Association has existed for some time; and though its workings are not much known, though its responsibility for the movements of the Paris Commune has doubtless been exaggerated in popular report, and though its congresses have apparently amounted to little, it furnishes a means of communication, and will furnish, when they choose, a means of union, for workmen all over the world, — a means of disseminating doctrines, of encouraging class-feeling, if need be, of concerting movements. There is a whole literature of periodicals, pamphlets, and books, devoted to furthering what are assumed to be the interests of working-men, advocating ideas and political doctrines which are not shared by the rest of the world, and a whole fraternity of agitators, spouters, and demagogues taking every opportunity to publish these doctrines. The anti-cooly organizations in California are occupying the chief attention of politicians in that State, and the legislature has at their instance appealed to Congress to place a prohibitory duty on Chinese immigrants. All these things are symptoms of an increasing disposition to general organization among the working-men, and of the growing breadth of their efforts and their contests. They indicate a tendency to a gradual consolidation of the men into a united class with class-feelings, class-prejudices, class-aims, and class-politics.

In England this consolidation has naturally gone much further than in the United States. The working-men's associations are wider, more united, and have made a more determined effort not only to rule the labor-market, but to make themselves felt in politics, and to secure a direct class representation in Parliament. The stratification of English society, its immemorial division into aristocracy, burgesses, and yeomanry, the more recent growth of the great middle class, the present predominance of manufacturing, the still sharply defined social classification of the people, — all these things make the consolidation of the working class a natural and perhaps an inevitable growth; and in a political fabric that has grown under and been adapted to class government, such a discrimination is possibly salutary as well as necessary, even though it may reach its development through strife. In the United States the working-men have not as yet sufficiently distinguished themselves from the mass of citizens to form an independent and united class throughout the country, though they may be fond of speaking of themselves as such. It is only in certain States that such a class is conspicuous: in Massachusetts for instance, where manufactures are in the ascendent, and where there has been for some years what is called a working-men's party, not yet of importance enough to claim much attention; or in California, where the introduction of Chinese labor has compacted the "Caucasian" workmen into a solid opposition. Nevertheless the indications we have described, and many others, are symptoms of the tendency to gradual formation of such a class throughout the country. Now whatever may be the effect of this in a country like England, whose political and social structure is founded on class distribution, it is quite sure that neither the social nor the political plan of the United States gives any room for a class which when completely consolidated amounts almost to a caste.

It is not necessary to enlarge on the embarrassment which the development of organized classes would bring upon us. We are just recovering from the desolating war which the only caste we have ever had among us indirectly brought upon us, not by its activity but by its mere presence. The trouble which an aggressive labor class would stir up for us would be of a very different kind from the trouble of slavery; but it would be real. The experience we have had of the cases in which class legislation has been pressed upon our rulers is not encouraging. Our whole polity is adjusted on the understanding that every citizen is, first of all, an American; that the interests of one are the interests of all. Our system of party government is only justified on the condition that parties are national. An isolated class, bent on special legislation for its own benefit and without interest in the general questions with which the country is concerned, is essentially an unpatriotic one. Ready at all times to trade off the general welfare for its own private interests, to any one who will promise support to the schemes on which it is intent, it offers the most dangerous temptation to demagogues, — is the readiest tool of unscrupulous political aggrandizement. In our own case the danger is aggravated by the fact that the mass of the working-men is made up of foreigners imperfectly assimilated to the body politic; of immigrants, or the children of immigrants, who have not yet forgotten the prepossessions of their own races, or arrived at interest or understanding for the important questions of our government; who are accustomed to be led, and not to think; and who therefore are at the mercy of whoever is most willing to flatter them.

But if the establishment of one class is to be dreaded in the midst of a people whose form of government and of society is based on the idea of homogeneity in its people, the addition of others of conflicting interests is yet more dangerous. The formation of one class stimulates the formation of another. The union of labor precedes and compels the union of capital. As yet, the employers of labor are not consolidated into a class; and the only thing likely to compress them into a close alliance is the aggression of labor-unions, which thus give consistency and force to the very oppressions, as they consider them, that they aim to resist. The difficulties which the pressure of capitalists, singly or in groups, have at times brought into our legislation, are enough to make us distrust any influences which tend to knit them also into a firmly united body. The antagonism of the two classes adds to the embarrassment of class-interests the perils of class-warfare. The experience of the past year is enough to show how bitter and wasteful such warfare is, and how heavily the burden of it bears upon the whole community.

The mere uniting of men of like occupation in associations for common advantage is, of course, not a matter for criticism. The tendency of such associations is to be judged, not by their union but by their conduct. There are many ways in which they might work for the improvement of their condition, with the sympathy and support of all thoughtful people; but unfortunately these are commonly not the ways to which they turn. When we consider the objects to which they do devote themselves, and, above all, the means to which they resort, their expansion into classes of national and international activity becomes a matter of very grave moment. It may be that our political fabric is firm enough and elastic enough to bear the strain of such activity, as it has borne still more threatening shocks, without injury; but we are likely at any time to be called to face very trying difficulties; and when we consider the possibilities of a

general union extending throughout Christendom, the outlook is serious enough. The extent and radical character of the measures demanded by the working-men, in their meetings in Massachusetts and California for instance, show the measure of the influence they wish to exert, — the expulsion of the Chinese; the regulation by Congressional action of the hours and wages of labor; the sequestration of lands which have been already bestowed by the government; the transportation and setting up of colonists at the public expense; the abolition of the contract system; the assumption by the government of all railroads and telegraphs; the abolition of poll-taxes, and of all restrictions, penal or otherwise, of the suffrage; and the undertaking of public works, not for utility but for the support of working-men. How great the risk is of all these things, depends on the strength of the class-union which it may be possible to accomplish. The character of the means to which they are ready, or may be led to resort, is plain enough from the experience of last summer's railroad riots; the peril of them, in the readiness of the working-men to ally themselves with the worst elements of the people, with the "hoodlums" of San Francisco and the mob of Pittsburgh; the recklessness with which the men are likely to be played upon and encouraged, in the truckling of newspapers and politicians, in the dishonorable complicity of the Pennsylvania militia, in the disgraceful presentment of the Pittsburgh Grand Jury, and in the incomprehensible blindness of legislators who are not ashamed to declaim in their places in Congress about the use of the troops, which alone could quell the riots, to oppress the working-men of the country.

PAINTING AND SCULPTURE AT THE CENTENNIAL EXHIBITION.—II.

[The report of Mr. John F. Weir in behalf of the judges of Group XXVII., embracing Plastic and Graphic Art.]

FRANCE.

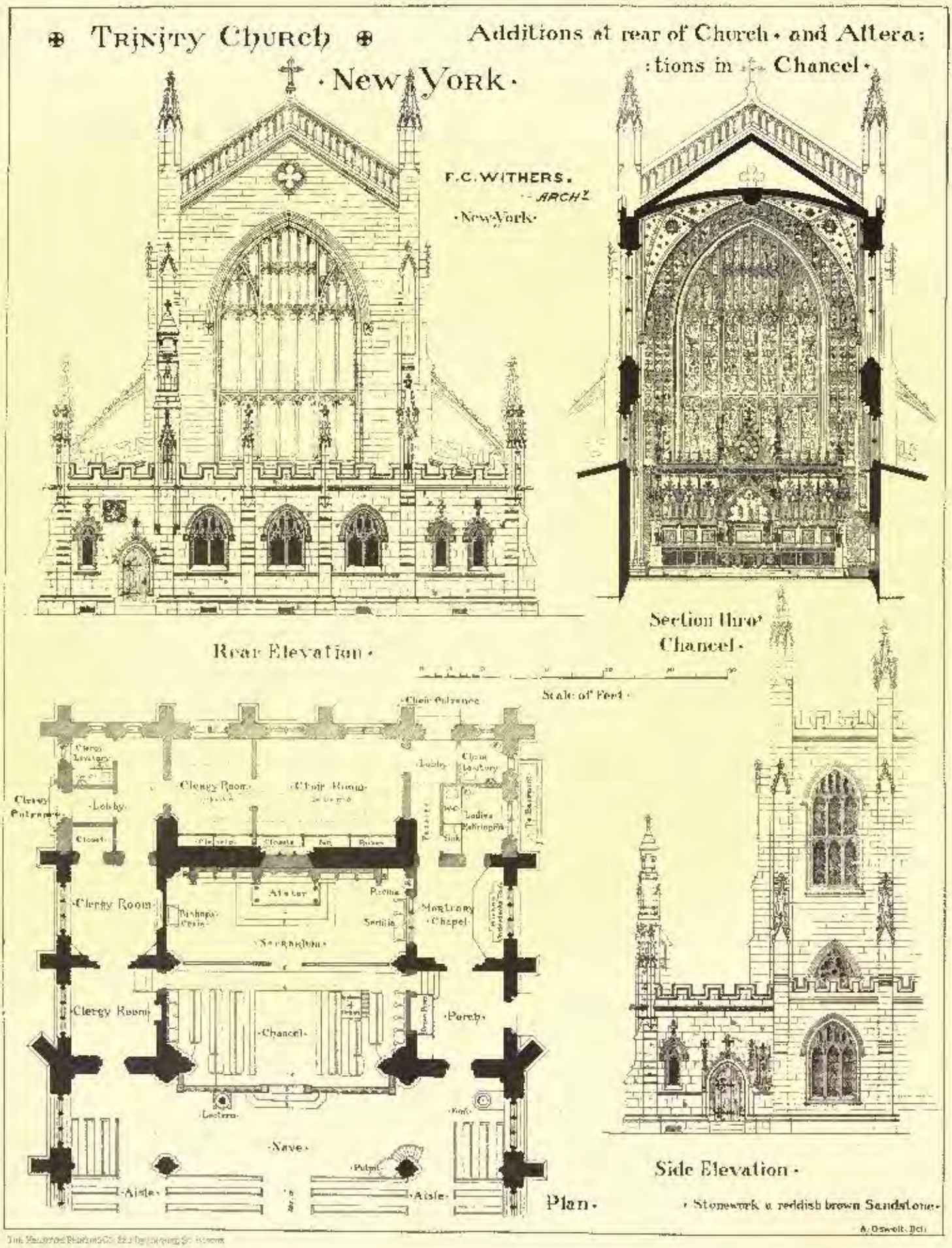
The exhibit of France in painting and sculpture affords subject for comment, partly on the ground that their art was not fully represented in the Exhibition, as well as in review of the character of the works selected.

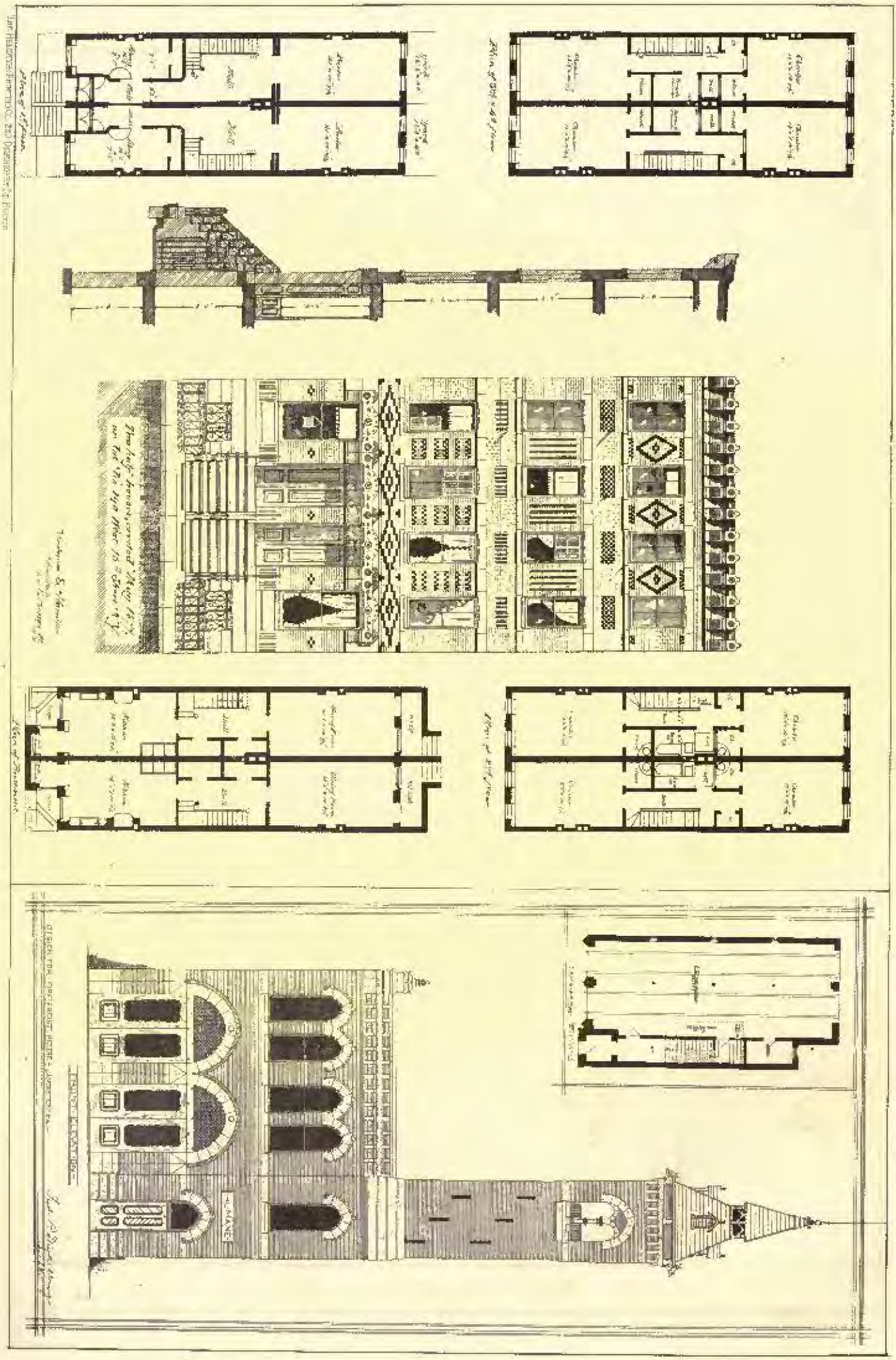
France, unquestionably, is the nation which fills the most conspicuous and the leading position in the art of the present century; and a careful review of the art of that country would embrace, in many particulars, a criticism of the most marked and characteristic tendencies of modern art. In commenting on the various kinds of excellence that are found united in this school, — if, indeed, the term "school" finds any proper application in modern art, where such classifications are fast being obliterated, — one is not slow to recognize that this superiority is due to several distinct causes. Passing by those considerations peculiar to the genius of the people, as well as the circumstances that affect the æsthetic temperament most favorably, the simple question of artistic discipline is one which the French have never underrated, if, indeed, the tendency has not been to carry this to excess by allowing technical skill to subvert higher aims in art. The admirable discipline afforded the art-student by the *Ecole des Beaux-Arts*, and in the private *ateliers* of the most distinguished artists of France, has tended to exalt and maintain this high standard of technical merit. An attractive and prevailing excellence of *technique* is certainly commendable in an art so difficult and complex as that of painting; but it is on higher grounds than this that the critic should estimate those qualities which constitute greatness in art, that give to the picture that charm of expression which enkindles *revery* and raises the work of the artist upon a common plane with that of the poet, the philosopher, and, unconsciously, with that of the moralist. France has not a few artists of this stamp, whose merit we may estimate fairly by this higher standard, and whose power rests not merely in the skilful handling of the brush or the chisel, but in the intellectual grasp and scope evinced in their art, and in a true poetic instinct which renders all technical display subservient to the expression of ideas and emotions, — which, indeed, is the true function of art. J. François Millet, Couture, and Delacroix were artists of this stamp; and others, now living, might be named who have impressed their individuality no less effectively on contemporary art.

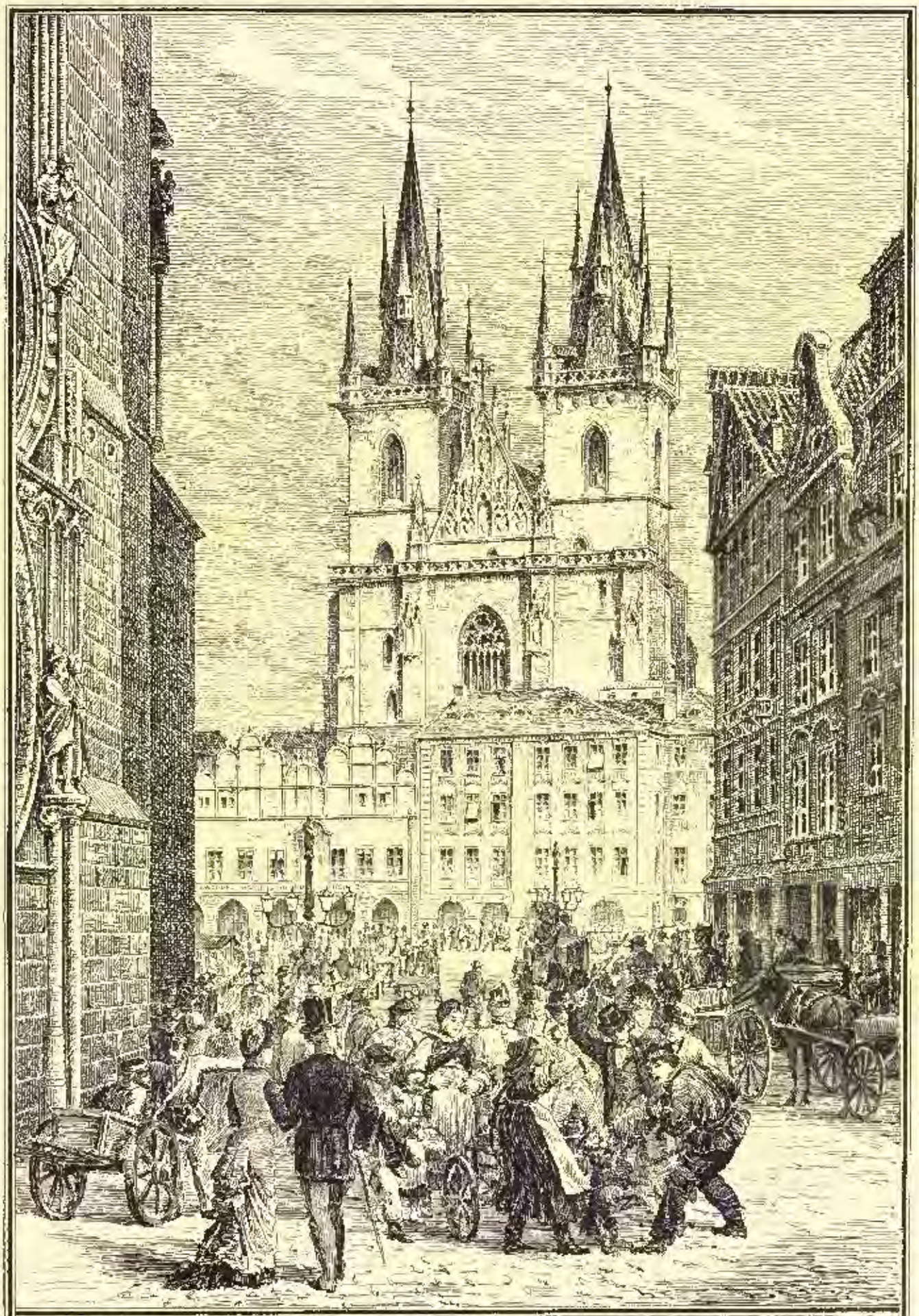
But the exhibit of France at Philadelphia was not even fairly representative of these higher achievements of French art. It affords, therefore, a less inviting subject for comment than if it were an adequate representation of the higher aims of this school. And it would be unjust to pretend that this display was, on the whole, a representative one. But in a more general, though less discriminating sense, we may consider it typical of many ideas prevailing among French artists at the present time, and as such it is worthy of attentive study. The absence, for the most part, of works of conspicuous originality and merit, leaves the *ensemble* of the exhibit to the mannerists who collectively form the school; for the founders of schools are not to be confounded with the elements that compose their following. We have here, then, very little that has earned for French art the high reputation it enjoys. It is necessary to observe the above distinction if we would discuss, with any degree of intelligence, questions of artistic merit. Art lives by sincere emotions; its true aim is a thoughtful and expressive one; but when this sincerity, this expression, is subverted by motives and considerations that are entirely foreign to art, its products then become mere objects of commerce: other and distinct ends are sought, and are not to be mistaken for those that are genuine. The absence, therefore, for the most part, of the representative names of this school, is the cause of that unfavorable impression left by the exhibit of France at the International Exhibition of 1878.

But it is with pleasure that we turn to those works which partially redeem this unfavorable impression. M. Carolus Duran contributed a fine portrait of Mlle. Croizette, of the Théâtre Français. The young lady is seated on horseback by the seaside, and the action is exceedingly spirited and natural. There is, too, an open-aired sense of life and animation pervading the picture, which is admirable. The horse is well drawn, and the technical execution is clever and confident. "The Convalescent," by M. Sain, is thoughtful and tender in feeling, and has qualities of true excellence. "The King's Entertainment," by M. Comte, is also very sincere in its aim. The figures are earnestly and seriously engaged, and this in a manner, considering the humorous character of the subject, that is almost irresistible. "The Drawing-School," by M. Trupheime, is a clever sketch rather than a finished work; though, after all, the question of finish is merely a relative one, and if the intention of the artist is attained, the picture may perhaps be properly termed finished. But M. Trupheime's work has the character of a study made directly from the scene itself; it has therefore the usual marks which distinguish the study from the work of the studio. The former has greater freshness and vivacity, the latter more completeness and finish. M. Pabst contributed "A Bride in Alsace," and M. Coltzman a "Court Scene," which are both commendable, though not strikingly meritorious. In *genre*, the pictures of this collection do not impress one favorably. They remind us of better things, done over and over again, and have little earnestness and less individuality. The usual boudoir scenes abound, — slight, superficial nothings, of which the observer soon grows tired, and the cleverness of textual representation fails to redeem the lack of sentiment or thought. In landscape M. Luminais sends his "Gauls returning with their Booty," which is bold, skilful, and decidedly effective. "The Oaks of Grand Moulin," by M. Dumeron, is also clever. M. Japy exhibited "The Valley of the Jura;" M. Renié, "October Snow;" M. Yon, "The River Seine;" and M. Zuber, "Near the Farm." These works evince, to some extent, those excellent qualities that are peculiar to French landscape; but they are not strikingly characteristic, nor of superior merit. But even subordinate artists of this school evince, in their treatment of this class of subject, a certain power that gives interest to their work. The vigor and solidity of their method, united with a skilful apprehension of the technical value of the *spot*, in landscape, are qualities which render their work effective, at least, — if, indeed, to be effective is not necessarily to be truly artistic. It is to be regretted that the exhibit of this nation, which was a large one, contained no examples of Lambinet, Ziem, C. F. Daubigny, Rousseau, Diaz, the Bonheurs, and others. And the deceased painters Troyon and Corot should likewise have been represented. Historical painting in France has given place, as elsewhere, to *genre*, — that is, if we accept the old conventional idea of history-painting, not infrequently based on mere extent of canvas and hackneyed themes of classic verse. In a less conventional sense, however, the French school was perhaps never stronger than at present in history, if we accept the works of M. Gérôme and M. Meissonier as representative of this class of subject. It is now discovered that *genre* may be even more strictly historical in character than canvases of a more pretentious title.

While we recognize much that is of a superior order of excellence in French art, and accord this excellence perhaps the highest place and praise, as a school it is not exempt from many vicious tendencies that are not only subversive of good taste, but which tend directly to destroy a genuine and healthy feeling for art; and these tendencies were abundantly displayed at Philadelphia. In fact, owing to the absence of better work, this impression dominated all others; and in order that we shall not do injustice to the more genuine character of French art, it is necessary to bear in mind that this representation was not complete. As an example of the style to which reference is here made, we may select M. Perrault's picture termed "Rest," — an *odalisque* reclining in a hammock above a running stream, in a sylvan solitude. The thorough knowledge of the human figure here displayed, the admirable drawing, the firmness and roundness of skilfully-modelled forms, and the clearness of the tones and flesh-tints, render this work captivating to the eye; but in saying this we say all that may be said of it in praise. This admirable rendering of the external forms, this clever execution, this merely realistic display of flesh, stimulate no elevated emotion, enkindle no revery. It is an attractive and

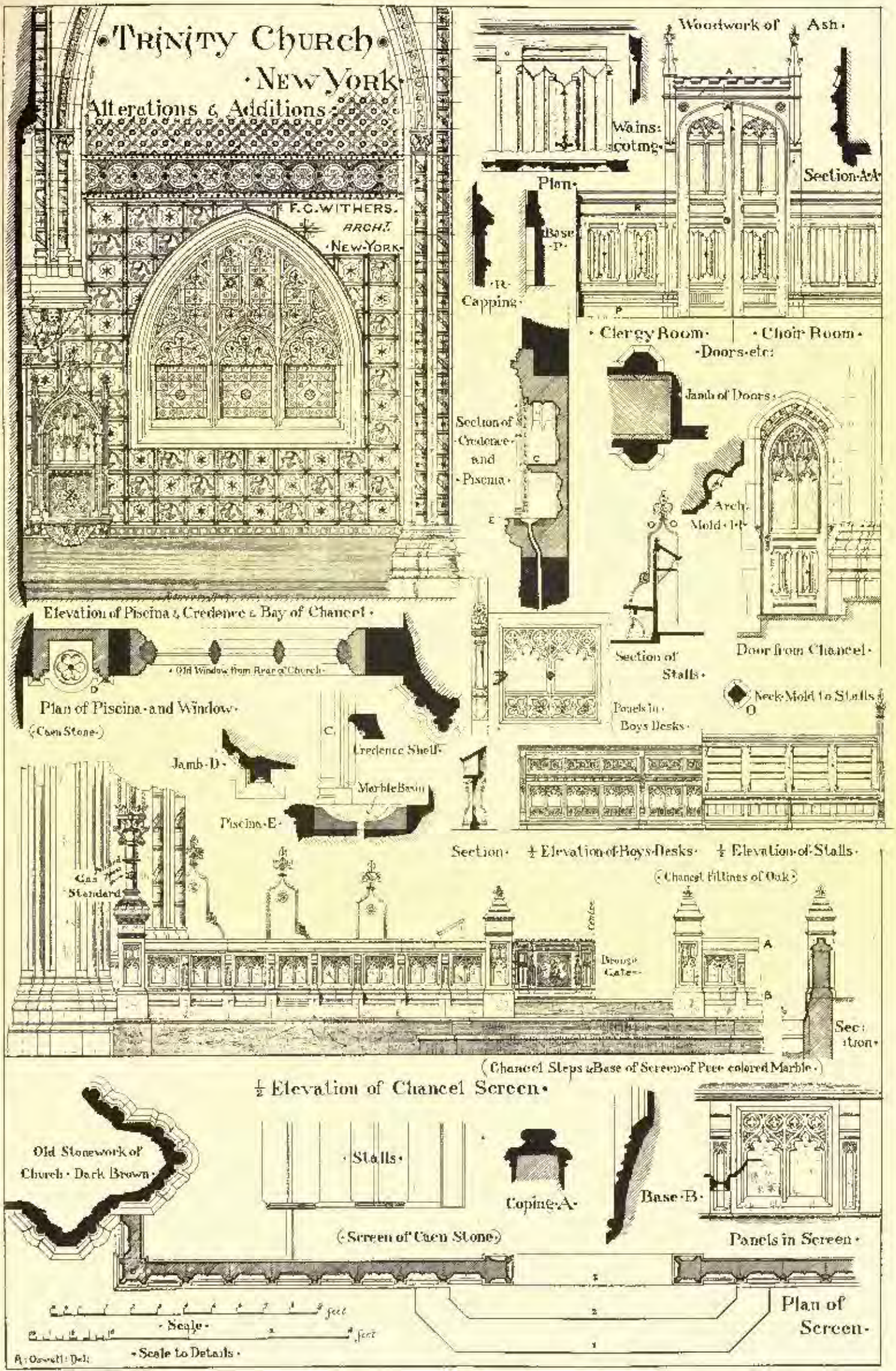

Trinity Church
New York
Additions at rear of Church and Altera:
:tions in Chancel
F.C. WITHERS.
ARCHT
New York
Rear Elevation
Section thro' Chancel
Scale of Feet
Choir Entrance
Clergy Room
Choir Room
Lobby
Closet
Clergy Room
Bishops Chair
Altar
Piscina
Sedilia
Mortuary Chapel
Sacrarium
Clergy Room
Chancel
Porch
Lectern
Nave
Pulpit
Aisle
Aisle
Plan
Side Elevation
Stonework a reddish brown Sandstone
A. Oswolt, Del.





THE "THEIN" CHURCH PRAG L.S.IPSER DEL.

THE HELIOTYPE PRINTING CO. 113 FRANKLIN ST. BOSTON


Trinity Church
New York
Alterations & Additions
F. C. WITHERS.
ARCHT.
NEW-YORK
Woodwork of Ash
Wains-cotng
Plan
Section A-A
Base P
R
Capping
Clergy Room
Choir Room
Doors etc.
Jamb of Doors
Section of Credence and Piscina
Arch. Mold I-I
Elevation of Piscina & Credence & Bay of Chancel
Old Window from Rear of Church
Plan of Piscina and Window
(Caen Stone)
Section of Stalls
Door from Chancel
Neck Mold to Stalls
Panels in Boys Desks
Jamb D
Credence Shelf
Marble Basin
Piscina E
Section
½ Elevation of Boys Desks
½ Elevation of Stalls
(Chancel Fittings of Oak)
Gas Standard
Bronze Gates
Section
(Chancel Steps & Base of Screen of Pure colored Marble)
½ Elevation of Chancel Screen
Old Stonework of Church Dark Brown
Stalls
Coping A
Base B
(Screen of Caen Stone)
Panels in Screen
Plan of Screen
Scale
Scale to Details
A. Oswell Del.

artful appeal to mere sensuous emotion, in the absence of any higher aim on the part of the artist. And this is by no means an exceptional illustration of tendencies that are very pronounced in this school. It is perhaps a natural consequence of an excessive contemplation of the external, and a direct issue from allowing mere technical execution an undue prominence.

A very ambitious illustration of the sensational in art is that of "Rizpah defending the Bodies of her Sons," by M. Georges Becker. This is a product of the annual exhibitions of the *Salon*, where it has become necessary to startle, or strike the observer with force, in order to command attention. Exaggeration and strained effect is essential for this when greater powers are wanting; and the artist has here secured a sensation, not by means of the sublime or the impressive, but through the horrible, the ghastly, and the melodramatic; and his technical skill has been more than equal to his purpose, for the picture is not without decided merit of this kind; indeed, in this particular it is more than clever,—it is masterly. Another equally large canvas is that of M. Clement, "The Death of Cæsar." When one has in mind the admirable and dramatic treatment of this subject by M. Gérôme, and that cool reserve power with which this artist has dealt with the historic facts of this great event with profound learning as well as with great artistic skill, M. Clement's attempt appears altogether inadequate. The instant is ill chosen, and the action unhistoric and forced. A subject of such moment, about which cluster historic interests of the gravest kind, foreshadowing results to which limits can hardly be assigned, should not be treated as if it were a mere brutal assault in the amphitheatre. There are silent, inwardly-acting reserve forces of which a great artist knows how to avail himself in selecting the true moment for such a picture; but in this case M. Clement has not risen to a level with his task.

While we notice these overstrained tendencies and false aims, it would be unjust to allow them to overshadow the acknowledged merits of this school. Since David gave to French art an impulse which impelled it forward in the direction of thoroughness of form, it has made steady and rapid progress. It has oscillated between classic and romantic influences, which have both contributed materially to nourish its growth. Ingres further stimulated that classic influence which is still strongly felt; while Géricault and Eugène Delacroix led the re-action of the romanticists, which is the influence now most pronounced. Had the exhibit of this nation at Philadelphia shown something of this march or progress in the development of French art, with but single examples of representative names, such as David, Ingres, Flandrin, Delaroche, Robert-Fleury, Delacroix, Couture, Decamp, and the recently-deceased artists Hamon and Gleyre, and others, together with the works of the foremost living artists of this school, the result would have been eminently instructive as well as satisfactory, and the impression made would have been quite a different one. So many admirable examples have been brought to this country of late that it may be said, without exaggeration, that its leading artists are quite as widely and favorably known here as they are in France, and not infrequently through their representative works. This opportunity for study renders it very easy to discriminate between that which is truly excellent and that which is imitative and meretricious in French art; and it is well to have it clearly understood that this distinction is now generally recognized.

In sculpture, the works in the French exhibit that commanded attention were in bronze; notably M. Bartholdi's "Young Vine-Grower;" "The Bohemian at the Spring," by M. Rossa; "The Juggler," by M. Blanchard; "Italian Shepherd," by M. Moreau-Vauthier; "Mercury, Whispering," by M. Moulin; and "Girl of Megara," by M. Barrias. These works reflect some of the merits that are widely recognized in French sculpture, which evinces a decidedly original and successful attempt to infuse into it the spirit and sentiment of modern life by drawing its inspirations not merely from tradition, or from a cold and calculating intellectual eclecticism, but from the living sources and sentiments that in every great epoch give character to art.

EARLY FORMS OF THE TELEPHONE.—In the preface of a book by Robert Hooke, F.R.S., published about 1666, occurs the following:—

"And as Glasses have highly promoted our seeing so 'tis not improbable but that there may be found many Mechanical Inventions to improve our other senses, of hearing, smelling, tasting, touching. 'Tis not impossible to hear a whisper at a furlong's distance, it having been already done; and perhaps the nature of the thing would not make it more impossible, though that furlong should be ten times multiply'd. And though some famous Authors have affirm'd it impossible to hear through the thinnest plate of Muscovy glass; yet I know a way, by which 'tis easie enough to hear one speak through a wall a yard thick. It has not yet been thoroughly examin'd, how far Otoconsticonns may be improv'd nor what other wayes there may be of quickning our hearing, or conveying sound through other bodies then [than] the Air: for that is not the only medium. I can assure the Reader, that I have, by help of a distended wire, propagated the sound to a very considerable distance in an instant, or with as seemingly quick a motion as that of light at least, incomparably swifter then [than] that, which at the same time was propagated through Air; and this not only in a straight line, or direct, but in one bended in many angles."

APPLICATIONS OF THE EQUILIBRIUM POLYGON TO DETERMINE THE RE-ACTIONS AT THE SUPPORTS OF ROOF-TRUSSES.—II.

BY JAMES R. WILLETT, A. I. A.

[A paper read before the Civil Engineers' Club of the North-West, Chicago, Sept. 4, 1877.]

FIGURE 5

Is similar in all respects to Fig. 4, except that some of the forces acting on the truss have an upward direction; but this does not alter the solution.

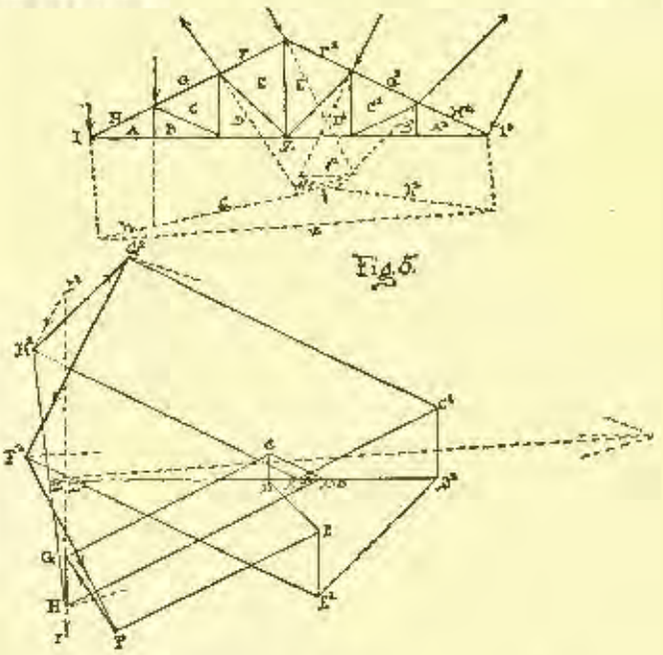


Fig. 5.

FIGURE 6

Is the same truss shown in Figs. 4 and 5; but it is loaded on the tie-beam as well as on the rafters.

The forces acting on the tie-beam are treated as one set, and their polygon of forces is (III); KK^2 being their closing line, and Z^3 the dividing-point on it. Diagram (IV) is their equilibrium polygon.

The forces acting on the rafters are treated as a separate set; their equilibrium polygon is shown by (II); and their polygon of forces is shown by the double line in (V). If the forces III and I^2H^2 are not considered, the closing line will be IIII^2, and the

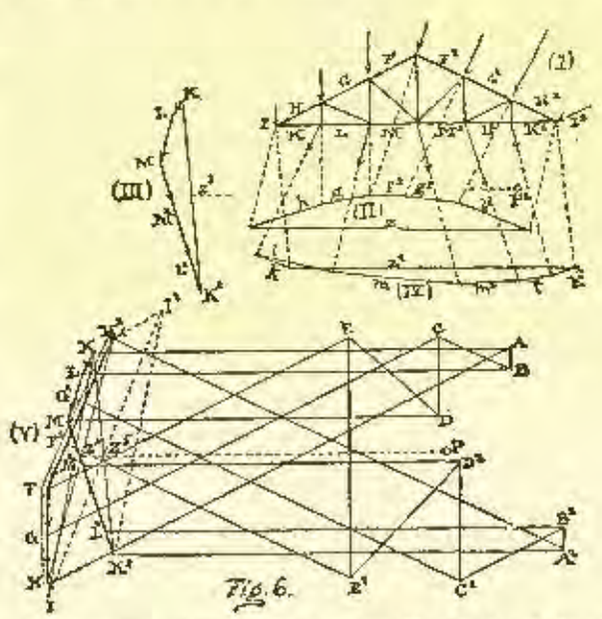


Fig. 6.

dividing-point Z^4. If III and I^2H^2 are considered, the closing line will be II^2, and the dividing-point Z^3. We will consider these forces as brought in; and therefore Z^4 will be the dividing-point on the closing line.

In order to combine these polygons of forces, (III) and (V), suppose (III) to be superimposed on (V), so that the point Z^3 in (III) coincides with Z^3 in (V), the relative directions of all the forces being maintained: this will give a complete polygon of all the

forces; and the re-actions at the supports will be IK and I^2K^2. These re-actions appear in the diagram to be parallel; but they are not necessarily so. The strains in the members of the truss can now be drawn in the usual way.

In the equilibrium polygon (II) it may be observed that the lines g, GF, and F F^2, all intersect in the same point, which causes the line f to equal o; and consequently it does not appear. This same effect is explained under the head of Fig. 3.

If it is not desired to introduce the forces IH and I^2H^2, then the point Z^2 should be superimposed on Z^1 instead of Z^2.

It is to be remarked, that, in arranging the forces in polygons (III) and (V), they must be arranged in a certain order; thus, if the forces on the right hand of the truss which have the exponent 2 are put in the upper part of (V), they must be put in the lower part of (III), or *vice versa*.

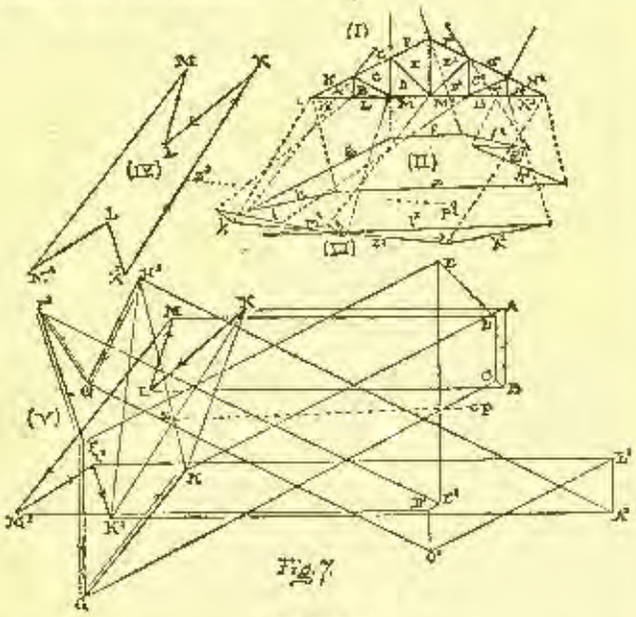


Fig. 7.

FIGURE 7

Is similar in all respects to Fig. 6, except that some of the forces act in an upward direction, and there are no loads upon the points of support. It is introduced here to show the universality of the method.

THE ILLUSTRATIONS.

THE ALTERATIONS IN TRINITY CHURCH, NEW YORK. MR. FREDERICK C. WITHERS, ARCHITECT.

In our issue of Nov. 18, 1876, we gave an illustration of an altar and reredos which was subsequently erected in Trinity Church, New York. The execution of this work involved several changes in the chancel arrangements; and as the accommodation for the choristers had hitherto been insufficient, the vestry determined to build an addition in the rear of the church, and at the same time re-arrange the choir-stalls, etc. The addition is of stone, corresponding with the stone-work of the church which was built by Mr. R. Upjohn in 1846, and contains a room 24 feet by 17 feet for the choristers, communicating with another for the clergy, with separate dressing-rooms, etc. The choristers enter through a doorway on the west side, over which, in a panel, is sculptured an angel blowing a trumpet. The priests' entrance is on the south side, and adjoining it is a carved niche in which is placed a figure of St. Paul, carved by Ellin and Kitson from a model made by Robert Smith of London. The interiors of the rooms are fitted up with ornamental ash wood-work, and the windows filled with colored mosaic glass by Charles Booth. In the chancel a doorway was cut in each of the side walls for the egress of the communicants; and, to obtain increased space for the choir, a Caen stone screen projecting three feet into the nave was built, and the stalls extended to the outside of the chancel arch. The stalls are of oak, the poppy-heads being richly carved. The floors are laid with Minton's encaustic tile, and the walls and groined ceiling decorated in color. The contractor for the addition was Philip Herrman, and the interior work and the whole of the carving was done by Ellin and Kitson of New York.

THE "THEIN" CHURCH, PRAG, BOHEMIA. DRAWN BY MR. L. S. IPSEN, ARCHITECT.

The old city hall square, "Der Altstädter Ring," the centre of the city of Prag, is, from a historical as well as architectural point of view, one of the most remarkable places in this old city, full as it is of interesting memorials of an eventful history. The west side of the square is occupied by the old Gothic *Rathhaus*, while on the east side, above a succession of irregular arches, rise the towers of the "Thein" Church, 253 feet high. This church was built in the fifteenth century, by German merchants, and has been added to from time to time. King George Podiebrad built the two towers and the gabled roof, which he ornamented with a statue of himself, in full armor and with drawn sword in hand; while above was a gilded chalice, the Hussite emblem which indicated that communion was there administered in both kinds. The statue, however, was at a later period taken down, and replaced by a statue of the Holy Virgin. The precursors of Johann Huss preached here as early as the fourteenth century, and from the pulpit once sounded the eloquent voice of the fiery Rohydana. In the church are the tombs of Bishop Augustin Lucian and the Danish astronomer Tycho Brahe, who died there in exile, having been invited to a seat in the University two years before. Entrance to the church is had through the archways in the lower part of the houses which, as with so many other European churches, were allowed to grow up around and against it. On the old square have been enacted some of the most violent and bloody deeds in the history of Bohemia, one of the last being the execution, by order of Wallenstein, of eleven officers found guilty of cowardice at the battle of Lützen during the Thirty Years' War.

DESIGN FOR A FIRE-ENGINE HOUSE. MR. F. P. DINKELBERG, ARCHITECT.

HOUSES OF MRS. BURROWES, NO. 10 WEST 38TH STREET, N.Y. MESSRS. ANDERSON AND HAMILTON, ARCHITECTS.

These two houses erected in May, 1877, on a full lot (25 x 100 feet), are very substantially built, and are intended for small families, being in size something between a French apartment and an ordinary sized house. Each house contains 18 rooms exclusive of closets, of which there is one for each room. The depth is 80 feet, and the extreme width of each house from plaster to plaster is 10 feet 9⅞ inches, the outside walls being furred. The front is of Philadelphia brick and Nova Scotia stone. The front doors are of cypress, and the dining-rooms and halls are finished with the same wood.

CORRESPONDENCE.

THE DOME CONTROVERSY. — NEW CITY HALL. — MITCHELL BUILDING AT MILWAUKEE. — FIRE-PROOF CONSTRUCTION.

CHICAGO, January.

The great dome controversy between the city and county authorities is still as far from an end as ever. The proportions it has assumed are amusing, if not profitable to the tax-payers. Your readers are more or less familiar with the circumstances attending the attempt to erect a city and county structure on one lot, but the situation of the building has not been made so clear in your columns. The lot is a square in the heart of the city, bounded by four streets. The county building occupies one side about 350 feet long, and fronts on three streets. The city building is to occupy the other side, and also fronts on three streets. There is a space of about 60 feet between; and the projected dome, if it is ever built, will occupy the centre of this space, its foundations encroaching within the exterior lines of both buildings. The county building had already been carried up to the main story floor before the half of the dome on that side had been commenced. Then the half dome was commenced, and the mild weather permitted the contractor to carry the walls up to nearly half the height of the main story. Meanwhile the main building has been carried up to the middle of the second story, where work has ceased for the season. A gap is left on the side where the dome is to be. This has been nearly closed by the dome structure, but a few days since the building committee ordered the work to be stopped. The walls are built in the most substantial manner, being 10 feet thick in the basement story and laid up solid with dimension-stones averaging 16 cubic feet each. What is now built, being one-half only, presents a strange appearance as it can be seen in section from the west side.

The concrete foundations for the city building had only been put down on one-third of the site when the superintendent ordered the work to be stopped for the winter. The contractors have therefore pushed along the cellar walls on that part until they now reach the grade line. Nothing has as yet been done on the foundations on the city's side of the dome site. The piles which were driven by the county contractor, and which the city has never paid for, are the only things to remind one of the possibility of the completion of the dome.

The whole county building and dome are the work of J. J. Egan, architect. The exterior of the city building is his work also. But Mr. L. D. Cleaveland, Superintendent of Buildings, who was ordered by the Department of Public Works to furnish his services as architect for the city, in his official capacity, has, under orders of the Building Committee of the City Council, changed the plan of that portion which might be occupied by half the dome, and provided for a connecting corridor which is to reach to the axis of the dome, where the authority of the city magnates ends.

Months ago several conferences were had by the county and city

committees, with a view to reconciling their differences on this question, which resulted in nothing. The county people have all along claimed that they have a *contract* with the city to build a dome conjointly. At that time it is well known that a compromise could have been effected, had the city people been willing to erect a rotunda or central exchange, only as high as the rest of the buildings. But on their part there was a display of negative obstinacy seldom equalled; while the county authorities were determined to give additional evidence of their natural propensity to spend as much money as possible, with reckless indifference to the wishes of those who are obliged to foot the bills. Consequently they ordered their half of the work to go on.

It is since then that the city's ground plans have been made and building commenced. The county meanwhile has succeeded in spending $70,000 on the dome foundations and walls, most of which is money wasted unless a dome or tower of the projected height of 320 feet is built; for if both parties should still agree to build a rotunda, the walls would be too thick, and would have to be reduced to make a rotunda of respectable size.

This is still the only practicable solution of the problem — or rather contest, as it should be called.

Mr. Cleaveland, who is an able architect, has made an excellent plan for the interior arrangement of the city building, except in the connecting part, where he has been controlled by the building committee. In its constructive features the materials are not alone *incombustible*, — a word too often mistaken for *fire-proof*, — but are to be made fire-proof in the true acceptation of the term. All the iron-work is to be protected. The interior columns will be made according to Wight's method. The spaces between beams will be filled by terra-cotta arches which protect the beams, and the girders will be incased with the same material.

This system of thorough protection to exposed iron-work has just been carried out in the Mitchell Building at Milwaukee, which will be ready for occupancy by the first of February. This is the most costly private building erected in the West for many years, and is a monument to its owner, Alexander Mitchell. It is the work of E. Townsend Mix, architect, of Milwaukee. The building covers about 103 by 125 feet, and stands on Water Street. This and the old Chamber of Commerce occupy the entire block running through to Broadway. Rumor says that the Chamber of Commerce, also belonging to Mr. Mitchell, is soon to be rebuilt in style equal if not superior to the Mitchell Building. The architecture of this is French Renaissance, perhaps too florid in treatment for a business building; but, as I said before, it is a monument, and the designer may be excused for making its architecture verge on what Frenchmen would call the *monumental*.

The material of the exterior is very light gray sandstone, with some polished granite for contrast. The same material is used in the main vestibule, which is imposing and elaborate in design. It has a mansard roof with small *pavilion* roofs at the corners, and a high *pavilion* with dome-shaped roof over the main entrance. This is used as the United States signal station. The signal lantern is at the base of the flagstaff, and forms a good composition. Here for once the domical mansard roof with its appendages is expressive of the purpose for which it is used. The dormers and chimneys, which are heavy, and rather crowded, are of stone; but all the ribs and crowning members of the roof, which are of elaborate design and good detail, are of hard terra-cotta from the Chicago Terra-Cotta Works. The entire roof is covered with porous tiles set between T-iron rafters, the slates and metal covering being secured directly by nails to the porous terra-cotta. All the iron columns throughout the interior are of the radiating web pattern, and made fire-proof by Wight's process. The girders are enclosed with porous terra-cotta; and the spaces between the iron beams are filled by a system of brick arches and hollow tiles, which fully protects the beams, and affords a very light construction, said to be not exceeding 40 pounds per foot. This is the invention of Sanford E. Loring of the Chicago Terra-Cotta Works. It is of such nature, however, as to require diagrams for a proper description. This is the first building in which it has been employed. All the small partitions are of hollow bricks. The interior finish is very elaborate. Wood has been used sparingly. The columns in the banking room which occupies the corner on the main floor, the basement office, and one in the second story, are finished on the exterior in a scagliola imitation of marble. All the others have a finish of Keene's cement. Sand being used with this exceedingly hard cement, they are fully as durable as stone. The girders are plastered on the porous tiles which incase them, and the ceilings on wooden lath suspended beneath the fire-proof protection to the beams. The decorative painting throughout is polychromatic, and is done by P. M. Almini of Chicago. It is a good example of progress in decorative art. The painting of the corridor ceilings in imitation of encaustic tiles, is original, but not to be commended. Hale's water-balance elevator is used for passengers, and a Hale direct-acting water elevator is provided for the use of the janitor and for any freights that may require it.

It is gratifying to know that in a time like this nearly the whole building is rented for an amount equal to a good interest on the investment. It is designed for offices throughout. The cost has been in the neighborhood of $400,000.

THE OLD RESERVOIR. — THE BROOKLYN MUSIC HALL. — WEAKNESS OF THE POST OFFICE BUILDING.

NEW YORK.

WHAT to do with the old Distributing Reservoir on Fifth Avenue and Fortieth Street, still agitates the minds of many of our city fathers and meddlesome managers. Its mere removal will cost $50,000; and in response to a suggestion that it be roofed in and made to answer as a great armory and drill-room, Commissioner of Public Works Campbell estimates that certainly $450,000 will be required, or with an allowance for contingencies, say about half a million, — certainly far more than New York is just now able to spend. Mr. Campbell very sensibly recommends that the space be turned into a public park, and thus avoid the error of rushing into building of any sort.

On Friday evening, the 25th ult., Mr. William R. Stewart died at his residence on Fifth Avenue. Mr. Stewart will be remembered as an upright, an able, and a successful builder. He came to the city a lad from Vermont, and, following his trade of a mason, undertook some of the most important work now standing in the city. St. Luke's Hospital, the *Herald* Building, H. B. Claflin's store, A. T. Stewart's residence on Fifth Avenue, and the Hotel for Working Women, with many other prominent buildings, were built under his superintendence. He was one of that class of builders who were willing and able to do the very best class of work, and who would not stoop to the low shams now so common.

Among the recent additions to our professional ranks is Mr. Bruce Price, whose first work here is a flat-house, at 21 East Twenty-first Street. Outside, Wyoming blue-stone is used up to the water-table; above, Philadelphia brick and Ohio stone with a red tile roof. It is an English basement house, with a segment-planned bay rising from a column resting on a bracket beside the entrance. The bay is treated somewhat as a single feature, and at its finish above is a large terra-cotta cornice decorated with foliage. The whole is six stories high, the roof showing a pediment with herring-bone brick-work, and a section of mansard. Within, the house is strictly fire-proof, with iron beams, and a main staircase carried up in a brick drum, with risers and treads of slate. An elevator is provided, and a servants' staircase at the back of the building where the kitchens are placed. As the dining-rooms are in front, the arrangement will demand the French system of service; and in many particulars the building recalls Parisian models, and reminds one of Mr. Price's long residence abroad.

Mr. George B. Post has also a notable private residence in hand, to be built at 15 East Thirty-sixth Street, for Mr. H. M. Braem, the Danish consul. It occupies an ordinary lot, but from the front a porch of North River blue-stone will project some feet and give opportunity for some careful carving. Moulded brick of the Peerless Brick Co. is liberally used, while large panels of terra-cotta ornament will be inserted beneath the window openings. These panels are Chicago terra-cotta, and are to be moulded after original designs. The plan is simple and well arranged, with the stairway thrown across the centre of the building. Iron beams and arched flooring with heavy walls will make the structure as fire-proof as possible. Its cost will reach $30,000. Mr. Post has also under way and nearing completion the Brooklyn Music Hall at the junction of Fulton and Flatbush Avenues, Brooklyn. The building is triangular in plan, the street sides about eighty feet long, and the broad end nearly one hundred. The street floor will be fitted up for stores. The entrance to the hall will be at the angle through a broad lobby and up stairs on either side. These stairs are peculiar in being double; that is, in place of leaving the usual headroom from one flight to another, Mr. Post has introduced another set of flights leading to the gallery-floor. This is a very compact mode of construction, though sadly puzzling to the mechanics who estimated on the building. Above the hall, which seats about 1,200 people, a series of lodge-rooms was required; and in carrying these and the roof above, Mr. Post has thrown a pair of trusses from the rear wall to a point at the entrance-end of the hall below. Here a cluster of columns supports a plate upon which rests one end of the lower chord of the trusses, which are twelve feet deep. They are some seventy feet long, and bracing each other form a construction of the strongest character; smaller truss-girders make up the flooring and carry the plates of the flat ceiling below. It is an excellent solution of a difficult problem, and the construction of the building as a whole is worth study.

For a work which is very far from being a model of construction, if it be in fact a model of aught save ugly instability, the Post Office building claims attention. Again the papers are filled with stories of cracking walls; and once more the public officers, for whose accommodation, security, and comfort the building was erected, are compelled to scurry from their quarters, while the shorers and patchers brace up the settling partitions and thrust in additional girders. The whole trouble is due to the practice of making large rooms on the lower floors and smaller ones in the upper stories, and then failing to use girders strong enough to sustain the brick partitions above. Deflection follows, cracks are seen, and what was neglected at first has afterwards to be carried out at heavy expense. Entirely apart from the architectural defects of the building, which are many and glaring, the construction is by no means so good as is popularly believed; and some time hence the cast-iron in the foundations may be heard from in an

unpleasant manner. The wood-work, what little there is of it, is bad, the elevators are models of cumbersome unhandiness, while the staircases are so arranged as to be as far out of the way as possible.

Meantime, of all the architects in this city, Mr. Thomas R. Jackson, who built and defended the Brooklyn Theatre, is found to fill the post of resident architect. *Apropos* of shams is a story of what is going on in the way of tenement-house "skin" building, brought out by the exposure of a heartless contractor who economized in plumbing by omitting his sewer-trap, and so caused the death of a tenant or two. But the whole story I will tell you in a subsequent letter, and speak now of the action of the Park Commissioners in dismissing Mr. Frederick Law Olmsted from his post as landscape architect of the department.

The yearly estimates of the department have been cut down; and as a measure of economy Mr. Olmsted is dismissed, despite a general protest. The opinion of the thinking classes here, who know Mr. Olmsted and his work, has been shown in a letter to the commissioners signed by the best of our business men and citizens.

But after a long debate the commissioners in their wisdom cut the knot by the adoption of the following: —

Resolved, That Mr. Frederick Law Olmsted be and he is hereby removed from the position of landscape architect of this department; and it is further

Resolved, That Mr. Frederick Law Olmsted be and is hereby appointed consulting landscape architect to this department, his services to be paid for at such rate as this department may determine from time to time, as they are availed of. W

THE TARIFFVILLE DISASTER.

Sheffield Scientific School of Yale College,
New Haven, Conn., Jan. 21, 1873.

To the Editor of the Courant, — The Farmington River, which flows toward the north at Tariffville, is crossed obliquely by the Connecticut Western Railroad, and hence the bridge was built on a "skew" of about thirty-eight degrees with the direction of the abutments and pier. The total length of about 333 feet is divided into two spans, each about 162 feet in the clear. The western span of the bridge fell when covered by a locomotive and cars: the eastern span, though also covered with cars, remained standing, and upon it the measurements given below were made.

The bridge is of the type known as a Howe truss, the two chords and the braces of each truss being wood, and the vertical ties iron. The lower chord is twelve feet above the ice in the river, and upon this lower chord rest the cross beams which support the stringers, ties, and rails of the single track. The width of the bridge is fourteen feet in the clear, or including trusses nineteen feet; and it has horizontal bracing both at top and at bottom. The depth of the trusses between centres is 21 $\frac{1}{12}$ feet, and they are divided into sixteen panels, each 10$\frac{1}{4}$ feet long. Each truss is terminated by the four vertical posts and stiffening rods usual in the Howe system; but the chords were continuous over the middle pier, thus uniting the two spans, and possibly rendering their action slightly different from that given by calculation. The southern truss of the west span fell first; and the chords are separated directly over the pier, those of the other truss breaking several feet west of the pier. The bridge was uncovered and unpainted.

The weight of the bridge as computed from my measurement is 1,320 pounds per linear foot. To determine the strength of the several parts, I assume the live load or weight of the train to be 2,250 pounds per linear foot. Engineers will bear witness that this is a small live load to use in discussing so light a bridge, particularly when no allowance for "locomotive panel excess" is made.

The top chord of the trusses is composed of four timbers, 10$\frac{1}{2}$ inches deep; two of the timbers are 6 inches wide, and two are 7$\frac{1}{4}$ inches wide; these are spaced apart by blocks 10 inches in width and bound together by bolts. The strain upon this top chord under the passage of a train is 983 pounds per square inch. The timber is pine, which, according to a recent recommendation by a committee of engineers, should never be subject to a compressive strain of more than 900 pounds per square inch, when (as in this case) the length of the piece exceeds ten times its least diameter. This recommendation extends only to sound timber. In the Tariffville bridge the timber of the top chord is badly decayed over the pier where it was torn apart, and in the fourth and fifth panels east of the pier. It is possible and probable that the top chord of the fallen truss was in a similar or perhaps a worse condition.

The lower chord is composed of four pieces, two 6$\frac{1}{4}$ inches wide, and two 7 inches wide, all 13$\frac{1}{2}$ inches deep. There are two end main braces, each 9 by 11$\frac{1}{4}$ inches. Each panel has a counter brace usually 7 inches by 8$\frac{1}{4}$ inches. These dimensions will enable engineers to compute the strains per square inch upon them.

There are three vertical wrought-iron tie-rods in five panels of the truss from each end, and two in the other panels. Between the first and second panels, two of the rods are 1$\frac{7}{8}$ inches in diameter, and the other is 1$\frac{3}{4}$ inches. The next set has two of 1$\frac{3}{4}$ inches, and one of 1$\frac{1}{2}$ inches. In the next set there are two of 1$\frac{5}{8}$ inches, and one of 1$\frac{1}{2}$ inches. The next set (between the fourth and fifth panels) has all three rods 1$\frac{5}{8}$ inches in diameter. The strain upon these rods under the passage of a train exceeds in two instances 10,000 pounds per square inch, or nearly twice as much as that allowed by bridge-engineers who do their duty. There is evidence that in some of the tie-rods the ends were not properly upset (or increased in diameter) before cutting the screw-threads upon them; should such be the case with those just mentioned, their effective diameters would be decreased $\frac{1}{4}$ of an inch, and the strain upon them would be more than 22,000 pounds per square inch, exceeding probably the limit of elasticity of the iron.

The above facts are sufficient to enable bridge-engineers to form an opinion concerning the strength of this bridge, and to judge of the causes of its failure. For the general public, however, these results need to be further popularized and emphasized.

The Tariffville bridge may have failed either by the breaking of the rotten upper chord, or by the breaking of the overstrained tie-rods. It is a matter of little importance which broke first: *the defects of either are sufficient to account for the disaster.*

The antecedent causes of the failure of the bridge were three: it was not properly built, it was not properly kept in repair, and it was not properly inspected by a commission appointed and paid by the State to make such inspection. That it was not properly built, there can be furnished, besides the above figures, good engineering authority. Trautwine, for instance, gives the following as the proper dimensions for a Howe truss of 162 feet span (the Tariffville bridge is a few feet longer): for the upper chord, a cross section of 396 square inches — the Tariffville bridge has 281; for the lower chord, 522 square inches — the Tariffville bridge has 365; for the end braces 265 square inches — the Tariffville bridge has 203; for the end tie-rods, 15 square inches — the Tariffville bridge has less than 8. In short, the designers of this bridge violated mathematical calculation and engineering precedent; to save the money which a few pounds of iron would have cost, human lives were daily put in danger.

Wooden bridges are usually covered to protect them from the action of the rain, ice, and snow; but this was left exposed for six years until the upper chord became rotten enough to give way under a fraction of the strain which it was intended to support, and no steps were taken to repair it. Not even the iron rods were painted. To save the money which repairs would have cost, the lives of passengers were daily risked.

It was not properly inspected by a commission which has examined it every year since its erection on behalf of the State. An efficient inspection would have discovered the defective tie-rods six years ago; an effective inspection would not have allowed it to remain exposed to the action of the weather for six successive years; an intelligent inspection would have detected and repaired the rotten timbers. For the lack of such inspection, human lives were lost.

The immediate responsibility for the accident must fall upon the officers of the railroad company, not for running two locomotives over the bridge, but for building such a structure and neglecting to keep it in repair. But the State of Connecticut is also responsible for sanctioning, as it has done annually by its railroad commissioners, the use of such an ill-proportioned and unsound bridge. The incompetency of such a commission to hold an investigation concerning the cause of the disaster will be apparent to every engineer. Mansfield Merriman.

NOTES AND CLIPPINGS.

The National Museum Bill. — The House Committee on Public Buildings and Grounds has agreed to report favorably the bill for the construction of a fire-proof building on the grounds of the Smithsonian Institute to be used as a national museum, appropriating therefor $250,000.

Accident to an Armory Floor. — Gen. D. D. Wylie, Chief of Ordnance of the State of New York, and the custodian of the State Arsenal on Thirty-fifth Street, says that during an evening in the latter part of last December, he was sitting in his office, which is on the second floor directly beneath the drill-room, when he heard a sharp crack like the report of a rifle in the gun-room adjoining his office. He at once made an examination, and found that one of the girders upon which the floor of the drill-room rests had sprung out of position, and the noise which he had heard was the snapping of an iron plate which connected the girder with another at the ends. The Twelfth Regiment was drilling in the room at the time, but as it had nearly finished he said nothing to alarm the members, and on the following day he informed the Department of Buildings of the incident. Deputy Superintendent Dudley, of the Department of Buildings, made the examination, and submitted a report, of which the following is an extract: "One column on the floor below the drill-room we found slightly out of plumb, and the girder on the top, supporting the drill-room floor, was twisted at the ends and split. The girders supporting the drill-room floor are not of sufficient strength for their bearings. These girders are only safe at 23,784 pounds, and have to sustain, under a vibratory load, 60,000 pounds. This is taking, according to our law, 120 pounds to the superficial foot, and double the same for a vibratory load. The girders, in my opinion, are not of sufficient size for the purpose for which the building is used, and are liable to become dangerous and unsafe."

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THE necessity of new terms in common use and in law to discriminate new things was illustrated in a recent suit at law in New York, where a decision turned, as it has in some other quarrels, on the question whether what is called an apartment-house is a tenement-house. Mrs. Musgrave had bought a house on Fifth Avenue from Mr. Sherwood half a dozen years ago, on the condition, stipulated in the deed, that no nuisances or tenement-houses should be put upon the adjoining land, which was occupied by houses belonging to Mr. Sherwood; and on the understanding and agreement, as she claimed, that only private residences should be allowed there. Lately Mr. Sherwood had turned the two adjoining houses into an apartment-house or family hotel, and had begun to build on the party-wall next Mrs. Musgrave, who then sued for an injunction to restrain him. Three points were claimed by her counsel, — that, the party-wall being completed when she bought her interest in it, he had no right to build it higher; that the stipulation in the deed against a tenement-house estopped him from building an apartment-house; and that the verbal agreement obliged him not to occupy the land with any thing but private dwellings. It is easy to see that the first point, if sustained by the court, would give rise to endless embarrassments among neighbors; but the judge (Judge Van Vorst) ruled that either joint owner of a party-wall may extend it upward or downward at his pleasure, provided he does no injury thereby to his neighbor's property. The verbal agreements were ruled out as irrelevant; and in regard to the second point the Court decided that as a tenement-house was defined by statute to be a house occupied by three or more families independently, while in the apartment-house the cooking and washing were done in common, the apartment-house was not a tenement-house. The decision, whatever may be its importance in law, plainly leaves the real issue untouched; for the disagreeable thing in a tenement-house is not the fact that its occupants eat together or apart, but the number and kind of neighbors it brings. The beginning of this suit and the granting of the first injunction, which is now dissolved, was noticed in a letter of our New York correspondent in No. 89 of this journal.

THE ingenuity of the counsel in this case is as nothing in comparison with that of the contractor who agreed to build the foundation of the dome of the famous and farcical Chicago Court House, and who having begun to build will not be stopped, but continues building upward, claiming that the foundation of the dome extends above the roof of the building. This aspiration so displeases the tax-payers that they talk of enjoining the Board of Commissioners and putting the Court House into the hands of a receiver, in case the contractor's claim for compensation is allowed. This occurs, as we understand it, in the County's half of the building, but we will not be too sure.

THE proposed building-law for the city of Providence, which is before the Legislature of Rhode Island, and of which we have spoken before (*American Architect*, No. 60), seems to be having a struggle for existence. It has apparently developed a good deal of opposition among a class of builders who like to build just as they please, and who are not deterred by any respect for their calling from appearing at a legislative hearing to oppose such provisions as those that require the testing of cast-iron girders, or that the cellars of houses built on made land should be concreted, or that wooden buildings more than eighteen feet high should not be built in the business part of the city, — which last provision one of the remonstrants naïvely argued did not seem to apply to a wooden city like Providence. The low opinion held in some quarters, of our profession and one nearly allied to it, appeared in the remarks of a builder who objected that the bill put the control of building into inexperienced hands, by referring it to architects and engineers, instead of mechanics and builders, who understood the business. Notwithstanding the fact that the public is indebted to architects and engineers for most of the improvements in building that have been made of late years, it is pretty sure that there is little hope of passing building-laws in any cities through their influence alone. But the better class of builders everywhere are concerned in the advancement of good building, and it is encouraging to know that in Providence they have taken a good part in preparing and forwarding the law.

ANOTHER example of the insecurity of iron construction, as it is commonly used, is the fall of a roof in Cambridge, Mass., just before we write. The iron roof over the furnace-room of the New England Glass Works fell down suddenly without warning. It was a hundred feet long and ninety feet in span, put up seventeen years ago, and has lasted perhaps as long as with our present habits of construction any piece of ordinary iron-work can be expected to refrain from falling. Fortunately no one was under it, and since nobody was hurt it is not likely that any great notice will be taken of the accident; but it is none the less a warning. The theories behind which ignorance takes refuge to avoid confession are fairly instanced in that which has been put forward in this case; viz., that the furnaces being out for some weeks, the iron girders [or trusses] had so contracted with the cold as to draw away from their bearings. A rough computation is enough to show the absurdity of such a supposition. If we take the co-efficient of expansion of wrought iron at .000007, which is large, and suppose that the temperature was 70 degrees below that at which the roof was set up, we have a contraction of .000007 x 70 = .00049, which, since the span was ninety feet, gives .00049 x 90 = .044 feet, or about half an inch. This makes it unnecessary to inquire whether the roof had never been allowed to get cold before, and whether it was built with the expectation that it never would. We have as yet learned nothing of the manner or circumstances of the building of it, and so have no opinion to give about it; but we know, what every engineer or architect of any length of practice can count from his own experience, that the majority of the men who design iron constructions in this country are deplorably ignorant of the properties and use of the material they employ; in spite of which they have the confidence of employers, on the ground that they are practical men.

THERE are no buildings to which the sanitary reformer can better direct his attention than to public school houses. They are usually built according to the worst traditions of an inconsiderate economy mingled with an inconsiderate expense. They are often elaborate and costly, but are almost always contracted in plan, unduly crowded, containing five or six schools where they should hold but two or three, shot up into the air one or two stories too high, and with the youngest and most helpless pupils packed into the upper rooms. They are badly ventilated, their plumbing and water-closets carelessly arranged, and are constructed without any regard to security against fire; the partitions and staircases being always of wood, and the means of egress in the older ones often very inadequate. A late report of Inspector Russell to the New York Board of Health shows a very unfortunate condition of the primary schools in one district of the city. It is a pretty uniform story of bad light, bad ventilation, bad drainage, bad arrangement, and bad administra-

tion. The wash-basins were generally untrapped, the water-closets and privies dirty and neglected. In one place the sewer overflowed the cellar, in another the open junction of the rain-spout with the sewer gave a chance for gas to escape under the windows, in another the opening of the door of a class-room barred the upper flight of stairs. What with bad sewers, unclean tenement-houses, and unwholesome school-houses, there is in New York a rich soil for the growth of sanitary improvements.

We have more than once spoken of Mr. LaFarge's decoration of Trinity Church in Boston, and have published lately a description of his work at St. Thomas's in New York. In an article in the Midwinter number of *Scribner's Monthly*, on "Recent Church Decoration," which is a description and criticism of these two undertakings, Mr. Clarence Cook records "a little natural disappointment to find how small a part as yet Mr. LaFarge's individual work plays in the interior" of Trinity Church, and complains that "the debt we owe to Mr. Cottier in this church has never been so much as hinted at in any thing that has been printed about it." There is no doubt, we believe, that Mr. LaFarge derived much benefit from such technical suggestions as Mr. Cottier's experiences in mural painting (which was a new process to Mr. LaFarge) enabled him to give in the course of two short visits to the church, and from having at his disposal, for the mechanical part of the work, men who had been trained under Mr. Cottier's hand; but it is equally true that no work of Mr. Cottier's design or execution is to be found in Trinity Church. It might properly have been said that Mr. LaFarge's original *hand*-work played a comparatively small part in the decoration; for he shared the execution of the figures, which it would have been impossible for him to have painted himself in any time that would have been allowed him, with the three artists whom we have before mentioned, Messrs. Millett, Lathrop, and Maynard; and of the purely decorative work he painted little. Nevertheless the figures were all painted from sketches by his own hand; and in the same way the decorative details — designed mostly by Mr. Lathrop — were in accordance with his sketches to a small scale for the whole interior. Since, then, the whole scheme of decoration, the arrangement of color, and the design of all the figures, is his, as well as a considerable part of the actual hand-work; to conclude that his share in the undertaking was a small one, — as, whatever was the writer's intention, a reader who derived his impression from the article we mention would be sure to conclude, — would be a great injustice to Mr. LaFarge.

The thing which strikes us first in Mr. Cook's criticism, and which deserves mention because it is characteristic of most of the criticisms on artistic work with which the public is supplied by literary men, — especially on such work as the architecture and decoration of a large building, — is the completeness with which it misses the purpose and point of view of the artist. Mr. LaFarge's work was essentially one of decoration, and as decoration first of all it should be criticised. Here was a large interior of many parts combined in a clear and simply arranged but elaborate composition. He had to provide a decoration which should adapt itself to all the parts, and confirm the whole impression of the architecture. As decoration, in arrangement, in form, and above all in color, it should be beautiful; should harmonize with the feeling of the architecture; and should have its own expression of dignity and religious solemnity. The figure-painting should, in keeping with all the rest, have its peculiar qualities of expression and technical merit. The paper in *Scribner* gives some intelligent criticism of the conception of the paintings as pictures, and finds some fault with the iconographic scheme, which, however, is as yet too incompletely seen to be the subject of criticism; but though it is a paper on decoration, of the decoration it says nothing. Even the prominent key-note on which the whole color is based seems never to have entered the writer's head, — the powerful contrast of red and green between the walls and the roof, the red toned into sobriety, the green reduced almost to a dusky gray; both relieved, and the darkness of the roof especially subdued, by the multiplied ornament in gold and sober color with which it is covered. This contrast, heightened in the ground-colors of the great central tower into deeper red and darker green, but still more overlaid with paintings and conventional decoration in rich but still soberly harmonized colors, underlies the whole scheme, and with the general distribution of the decoration must have been the first and leading conception in the artist's mind. It sounds audacious in description, and we remember noticing that the *Architect*, with an appearance of amused surprise, quoted a description of it, under the title of "a Boston Basilica," from some American journal, in which it was roughly set forth as having red walls, a green roof, and the ceiling of the apse solidly gilded. Yet the power with which Mr. LaFarge has carried out his bold conception, and subdued his wide range of rich coloring, in spite of obvious faults of detail, into a harmony of unusual solemnity, is to us the most striking characteristic of the work. We doubt moreover whether any artist who had not got his first training in color as a painter of pictures rather than of decoration could have succeeded in it.

PAPERS ON PERSPECTIVE.

III. — SKETCHING IN PERSPECTIVE. THE PERSPECTIVE PLAN. DIAGONALS.

Having in the first of these papers considered the nature of the phenomena with which perspective drawings have to do, we examined in the last paper the aspect of the drawings themselves, first observing the relation which lines parallel to the plane of the picture bear to their perspective representations, and then the relation that the perspective lines and planes, by which the objects represented are defined, bear to the perspective of their vanishing points and vanishing traces.

41. Plate II. illustrates almost all the points raised in explaining Plate I.; the roofs that are below their traces being all visible, and those that are above them being all out of sight, while all the lines of intersection of the planes converge to the intersection of their traces. This is specially noticeable of the *valleys* of the main roof in the lower picture.

42. The trace of the system of vertical planes I′I″ to which these valleys are parallel, and which accordingly passes through their vanishing points (13 c.), and which was not drawn in the previous plate, is here shown. Since the lines which indicate the position of these valleys in the perspective plan lie in the same vertical planes with the valleys themselves, they must have their vanishing point in this same vertical trace T′I′I″; and since, like all the lines of this plan, they lie in a horizontal plane, their vanishing point must lie in the Horizon (13 d); it is therefore to be sought at the intersection of T′I′I″ with the Horizon, at the point marked V_X (13 e). Since the vertical planes in which these valleys lie are obviously at an angle of 45° with the principal vertical planes R Z and L Z, this line X, whose vanishing point is at V_X, is at 45° with the lines R and L.

43. If we put the eye at the station-point S, four or five inches in front of C, and, looking first at V_R and V_L in directions at right angles to each other, look then between them so as exactly to divide the angle, we shall be looking in the direction X, and shall see V_X directly in front of the eye (7).

We will retain this notation, V_x, throughout these papers, to denote the vanishing point of horizontal lines making an angle of 45° with the principal horizontal lines, R and L; and shall call it, for brevity, the vanishing point of 45°.

44. The little building on the left has steeper roofs than the other, their slope being the same as that of the roof of the tower. Their vanishing points are accordingly N_1, M_1, P_1, etc.

As the tower roof is supposed to slope alike all round, the hips P_1 and P_1' lie also in parallel planes, at 45°; their projection on the perspective plan has V_X for its vanishing point, and V_{P1} and V_{P1}' lie in the trace of the plane I′I″ at equal distances above and below the Horizon (36).

45. The position of these vanishing points and traces is supposed to be determined just as the position of the other leading points in the picture is determined; that is to say, their relative position on the paper is made to correspond to the relative position of the real points and vanishing points, as nearly as may be, by the eye; by looking first at the point, and then looking for the corresponding place on the paper. The position of the leading vanishing points being thus determined, the vanishing traces can be drawn connecting them, and new vanishing points such as V_2 and V_2' determined by their intersection.

If the propositions illustrated in the last paper are borne in mind, a consistent and tolerably correct perspective sketch can easily be made, the eye being greatly aided in its estimate of the relations of things and their apparent shape and dimensions, by the considerations to which attention is thus directed. The principal points being fixed by the eye, the other points are then determined, partly by the eye, partly by means of lines drawn to the vanishing points.

46. A great advantage may also be found in the use of a *perspective plan* of any object that is to be drawn, especially in sketch-

ing not from objects but from the imagination. Thus in the figure (Fig. 5), although the main building could be drawn without much chance of error, it is by no means so easy to determine just where the tower behind it should make its appearance over the roof. By completing the plan, however, as is done by dotted lines, its position is at once determined. The objection that it is undesirable to cover the drawing with construction lines may be entirely met by drawing the plan at a lower level, as if it were the plan of the bottom of the cellar, ten or twenty feet underground, as is done in the figure; and for the purpose in hand the cellar may be supposed to be of any convenient depth, so as to get the plan entirely out of the picture.

47. This sinking of the perspective plan has two incidental advantages. In the first place, it makes it practicable to draw it on a separate piece of paper, which may be removed and kept for use a second time, if, as often happens, a perspective drawing needs to be made over again. In the second place, it defines the positions of things much more accurately; the lines by whose intersection the position of the vertical lines is determined cutting each other more nearly at right angles. It will be seen in the figure that the lines in the real floor-plan cut each other so obliquely that it is not easy to tell exactly where the corners of the tower do come.

48. It follows from this that the level at which the object is to be shown in perspective is quite independent of the level chosen for its plan. This also is illustrated in the figure; the same plan serving for three representations of the building, at different levels, one nearly even with the eye, with a bird's-eye view below, and with what might be called a toad's-eye view of it above. The same vanishing points being employed in all three sketches, the phenomena pointed out in the previous paper, of the appearance and disappearance of plane surfaces according as they come below or above their horizons, are here again illustrated.

49. In thus sketching in perspective, whether from nature — that is, from a real object — or from the imagination, it will be found much easier to determine vertical magnitudes than horizontal ones; that is to say, it is easy to determine the position of horizontal lines, but not their length; and the length of vertical lines, but not their position.

In the sketch, for example, the position of the vanishing points, and the position and height of the front corner of the building to be represented, being once assumed or determined, other heights, whether equal or different, can easily be determined by means of parallel lines drawn to the vanishing points. The height of an object having been assumed in one part of the picture, an object of the same height can be put in anywhere else by the employment of parallel lines.

But though it is thus easy to represent the three gable-ends in this sketch as being of the same height, it is not so obvious how to draw them so that they shall all seem equally wide.

50. Moreover, the subdivision of the perspective of vertical lines, whether into equal parts or according to some given proportion, presents no difficulty; for the vertical lines are parallel to the picture, and their perspectives will accordingly be divided just as the lines themselves are (20).

But while the division of vertical lines and their apparent diminution in size is easily managed, the subdivision of horizontal and inclined lines (except those which like the vertical lines are parallel to the plane of the picture) is a matter of difficulty. The further divisions are smaller, but it is not clear how much smaller.

Two methods are adopted to determine this, — the method of Diagonals and the method of Triangles. Let us take the first, first.

The method of Diagonals is illustrated in the various figures of Plate II. It applies to parallelograms whose perspectives are given or assumed the following propositions: —

51. *Proposition* 1. A line drawn through the intersection of the diagonals of a parallelogram, parallel to two of its sides, bisects the other sides and the parallelogram itself.

This process may be repeated with each half, and the given figure, or any line in it, divided into 2, 4, 8, 16, or 32 equal parts, etc. See Fig. 3, 1.

The application of this to the perspective of a parallelogram is shown in Fig. 5, where the left-hand side of the larger building is thus divided.

52. This is the common way of dividing a perspective line or surface into halves; and it is constantly used, as in the left-hand side of this building, and on the right-hand side of the building above (Fig. 4), to determine the centre line of a gable, and the position of its apex.

53. Less familiar is the employment of this principle to ascertain the vertical axis of a tower two of whose sides are given in perspective, as in Fig. 5. If diagonals are drawn across the tower, from two points on the right-hand vertical corner to points at the same levels on the left-hand corner, they will intersect in the middle of the tower, and a vertical line through their intersection may be used to determine the apex of the roof which covers it, as in the figure. These diagonals lie in a vertical plane that crosses the tower diagonally.

54. It is obvious that this furnishes an alternative method of determining the slope of those roofs. Instead, that is, of fixing the position of the vanishing points of M and M′, P and P′, and thus obtaining the direction of these inclined lines, we may assume at once the direction of any one of these lines, say the nearest one. The intersection of this line with the central vertical line fixes the height of the roof; the other slope and the other roofs are then easily drawn.

55. Perspective is full of these alternative methods, different ways of doing the same thing. Which way it is best to adopt in any given case, depends upon the nature of the case. In the present instance, the vanishing points V_K and V_K' being outside the picture, the method of diagonals is rather the most convenient.

56. It is to be observed, however, that though V_N and $V_{N'}$ are off the paper, V_P and $V_{P'}$ are within easy reach. It is generally worth while accordingly to fix the position of the more remote vanishing points, so as to determine the position of the traces or horizons that lie between them, and the points where those traces intersect, even if we make no direct use of the vanishing points themselves. Thus in the plate, although the lines M_1 N_1, M_1', and N_1', which give the slope of the roofs of the small house and of the tower, are all at a distance, the traces of the planes of the roofs T R N_1, T L M_1, T R N_1', and T L M_1', all cross the paper, and their intersections V_{P1} and V_{P1}' are close at hand.

57. *Proposition* 2. If through the intersection of the diagonals a second line is drawn parallel to the other two sides of the parallelogram, a single diagonal suffices to effect the subsequent subdivisions, as is exemplified in Fig. 3, 2, and on the left-hand side of the larger building in Fig. 6, below.

58. *Proposition* 3. Conversely, if a line drawn from one corner of a parallelogram to the middle of one of the opposite sides be continued until it meets the other side, prolonged, the length of that side, or of the parallelogram itself, may be doubled, and, by a repetition of the process, tripled, quadrupled, etc. See Fig. 3, 3.

This proposition is of great use in perspective drawing, as may be seen in Fig. 5, where the gabled end on the right is several times repeated, each time smaller than before.

It will be seen that the gable ends of the roofs grow steeper and steeper, their lines converging, in fact, to the distant vanishing points M and M′. By obtaining those points, the accuracy of these results can be tested.

59. *Proposition* 4. If one side of a parallelogram be divided in any way at one end, equal divisions may be laid off at the other end by means of two diagonals. See Fig. 3, 8.

This is very useful in giving a symmetrical treatment to a surface shown in perspective, as is seen in the left-hand building, Fig. 5. The position and width of the nearer window on the side of the building being assumed, the vertical lines enclosing the further window are easily found.

At the end of the building the inclined lines of the gable, which may be regarded as the semi-diagonals of an unfinished parallelogram, answer the same purpose. The base of any isosceles triangle can be divided in this way.

60. *Proposition* 5. If one side of a parallelogram be divided in any way, the adjacent sides may be similarly divided into proportional parts, by means of one diagonal; and by using the other diagonal the order of the parts may be reversed. See Fig. 3, 4.

By this means any required division of a line given in perspective may be effected, as is shown in Fig. 6, on the right-hand or shaded sides of both buildings. The required division is made on the vertical line, and then transferred to the horizontal line by means of the diagonal, the nearest corner of the small house being divided according to the desired position of the door and windows, and that of the large building into three equal parts.

61. If the diagonal makes an angle of 45° with the adjacent sides, their segments will of course be not only proportional, but equal, each to each.

In the perspective plan of the small building, for example, in which the diagonal is directed to V_2, the "vanishing point of 45°," and accordingly makes an angle of 45° with the sides of the building, it appears that the window is just as far from the corner on one side as the further edge of the door is on the other. It appears also that the plan of this building is just four squares, though it hardly looks so, the side being greatly foreshortened, while the main part of the other building is just as broad as it is long, comprising nine squares each as large in plan as the tower.

62. In applying this proposition to a perspective drawing, the line on which these parts are first laid off must of course be a vertical line, or some other line parallel to the plane of the picture, as it is only in the case of such lines that the division of the perspectives is proportional to that of the lines themselves (20).

63. *Proposition* 6. It is not necessary that the length of this line shall be previously determined. Indeed, it is more convenient that it should not be, as it is easier to establish a given ratio of parts on an indefinite line. The equal or proportionate parts may be set off at any convenient scale on any convenient line, that touches the end of the line to be divided, and the diagonal drawn without completing the parallelogram, as in Fig. 3, 5.

The division of the long wall in Fig. 6, for instance, is effected by setting off three equal distances upon the further corner, just as well as by dividing the near corner into three equal parts.

64. It is not necessary in any of these cases, of course, that the

parallelogram shall be a rectangle. The inclined line N, for example, in the middle of the upper figure, Fig. 4, is divided into three equal parts by equal divisions laid off on the vertical line that bisects the gable.

In these last propositions, it will be observed, use has been made of only half a parallelogram, that is to say, of a triangle.

65. Proposition 5 may then be re-stated as follows: —

If one side of a triangle be divided in any way, the adjacent side may be divided into proportional parts by means of lines drawn parallel to these two sides and meeting on the third side. See 4, Fig. 3.

66. And from Proposition 6 we may derive this: —

If from one end of a line there be drawn an auxiliary parallel to the plane of the picture, any parts taken upon the perspective of this auxiliary may be transferred to the perspective of the line, in their true proportions, by means of a third line joining the last point taken on the auxiliary with the other end of the first line (65).

67. But as any line, drawn in the picture at random, may be conceived of as being the perspective of a line, which it exactly covers and conceals, drawn parallel to the picture, it follows that *any line whatever, touching one end of a perspective line, may be used as an auxiliary by which to divide it in any required proportion*; and, the triangle being completed, the first segments of the broken lines by which the proportions are transferred will be parallel to the line to be divided and directed to its vanishing point, and the second segments will be actually parallel to the auxiliary line, since its vanishing point is at an infinite distance.

68. Thus if it is required to divide the plan of the left-hand building into five equal parts, instead of four, we may from the further end of the side draw a line in any direction, say at an angle of 60°, and lay off on that line five equal parts, using any convenient scale, as in the figure. Completing the triangle and proceeding as above, we get the points of division desired. This triangle does not lie in the horizontal plane, but in an oblique plane, containing both the horizontal line to be divided and the auxiliary line; this line is parallel to the picture, and is shown in its true direction.

The next paper will take up the division of lines by the Method of Triangles.

THE HOUSE BEAUTIFUL.

Among the many publications which the steady growth of popular enthusiasm for the various forms of house decoration has called out with the aim of assisting those who feel the impulse of the time, there has appeared, in answer to the general demand for some definite advice, 'The House Beautiful,'[1] by Clarence Cook. The essays on Beds and Tables, Candlesticks and Stools, that comprise it, were published originally in *Scribner's Magazine*, where they gained popularity by the interest of the subject, by their own liveliness, and the beauty and number of their illustrations. Mr. Cook has introduced his essays to the public, without apparent alteration, in the form of a large and sumptuous book, — fine to look upon, and uncomfortable to read, — forgetting that the lively and somewhat thin talk which is accepted in a popular magazine may ill support the dignity of a bulky volume.

The introduction and preface through which one enters the House Beautiful are sensible and without pretence, and give a pleasant suggestion of the simplicity, beauty, and utility to be looked for in the following chapters. His advice to the reader is to consult his own needs and desires, assuring him that with good taste and contrivance these necessities will give a charm to the home that wealth without taste cannot bestow. The book itself does not bear out the promise of its vestibule. It contains a great many sensible suggestions, much useful information, and the indications of a wide reading, but displayed with little coherence of idea, and diluted with a great amount of what it is hard to call by any better name than artistic twaddle. It is divided among four subjects, — the Entrance, the Living-Room, the Dining-Room, and the Bedroom; and in each the author makes some common-sense and practical suggestions, although there is a want of method in his advice that must be sometimes puzzling.

A hall, he says, should be large in proportion to the rest of the house, giving a hospitable and generous look to the whole; and draws the plan of a small house differing from the general style of New York houses, where there is plenty of room and light. The dining-room should be large and hospitable, with no more furniture than called for; not of necessity sober in coloring as has been the fashion for many years, but cheerful and homelike in appearance. He shows several cuts of old-fashioned sideboards that would look well in dining-rooms, but gives the advice that "unless he could get an old one and a good one too, he should much prefer having one made after a design of his own time." There however are no modern designs among these illustrations. The old blue India china is considered "the most serviceable for every-day use; and although many people will be a little repelled by the first blush coarseness of the ordinary blue India china, let them remember that this coarseness troubles them more than it would if they had not been used to the impeccable smoothness of the French porcelain, and then it is really not the china that is coarse, but the decoration," — which, we may add, is quite enough.

He has a wholesome disdain for finery (unless it be in book-making), and "uses the word living-room instead of parlor because he is not intending to have any thing to say about parlors;" and "begins with taking the largest and pleasantest and most accessible room in the house, gives it up to the wife and children in the day-time, and to the meeting of the whole family when evening comes. The furniture should be the best designed and best made that we can afford, all of it necessary to our comfort, and intended to be used; not an article allowed that cannot earn its living and cannot prove its right to be there. The wants first provided for, we will then admit the ornament of life, — easels, pictures, engravings, bronzes, books, chief nourishers in life's feast; but in the beginning these are to be few, and the greatest care is to be taken in admitting a new-comer. The room ought to represent the culture of the family — what is their taste, and what feeling they have for art; it should represent themselves, and not other people; and the troublesome fact is that it will represent them whether its owners would let it or no." A piece of good advice here given is "that every piece of furniture in the room must have a good and clear reason for being there." Then follow many designs for chairs, sofas, bookcases, cabinets, etc., suitable for use in such a room, few of which seem to possess one essential requisite for their admittance to the House Beautiful, — that of beauty; as for instance, in No. 17, there is neither beauty nor utility in the "*chaise longue*," and although interest attaches to it from the fact that George Fox once slept on it, that is hardly a recommendation for a book that assumes to instruct us in the beauty with which a house should be adorned. The chair in No. 23, "which appears perfect of its kind, both for the elegance of its lines and its comfortableness as a seat," gives, we must say, little impression of flowing lines or gracefulness to the reader. The greater number of the chairs seem to be heavy or clumsy in their construction, and ugly; they may be comfortable, but one does not feel inclined to try them. "The handsome chair of carved oak" (p. 260) hardly agrees with either simplicity or beauty of style. The carving may be handsome, and the chair comfortable; but whatever its history, it could not have been more involved than its construction. In Nos. 14 and 15, where the designs made from the settle or ironing-table of the present day are found, Mr. Cook introduces the pictures, but finds fault with the design, the form, and the workmanship, so that we feel as if led into a perplexing place, only to be cast adrift.

These examples suggest what seems to us the fundamental fault of Mr. Cook's book. We do not see how it is to be a guide in taste for anybody; for the author's ideas of taste seem to be all at sixes and sevens. A bit of furniture may take his fancy by quaintness, by association or history, or by an assumption of fitness; and uncouthness, ill proportion, or recklessness of design, are no barrier to his admiration. Sometimes it is primness and sometimes license, sometimes clumsiness and sometimes flimsiness, that seems to win his applause. Mr. Cook, to be sure, disclaims any intention of furnishing his readers with a series of examples to be copied; but we can only infer, then, that his profuse illustrations are meant as guides to their tastes. If he had only meant to give them practical information, he might have saved himself three-fourths of his writing, and them three-fourths of their money.

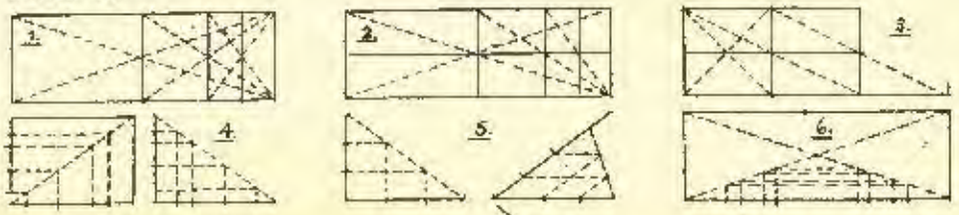
The wood-cuts, for which *Scribner's Magazine* is justly famous, are here mostly the work of Mr. Marsh, and are marvels of cutting superbly printed. As specimens they deserve, as Mr. Cook says, to be preserved in a volume. It is only to be regretted that they are often wasted on indifferent subjects, and, we must say frankly, on inferior drawings. Mr. Cook's comments on them, which are mainly indiscriminate eulogy of Mr. Lathrop's work, seem to us decidedly inexpert. Mr. Lathrop's illustrations, besides being often undecided and faulty in drawing, are apt to be disagreeable in texture, full of uncalled-for black lines and stains, and harsh and spotty in effect. On page 38, for instance, it is found necessary to bring out the glass by means of a large spot of black behind it; so on page 293, all tone and gradation is lost, and the cleverness with which the effect of firelight is secured cannot disguise the essential ugliness of the picture. The few drawings by Mr. Sandier, which tell their story simply and with refined precision, in spite of a little want of emphasis, are a relief to the eye after the blaze of Mr. Lathrop's coruscations in black and white.

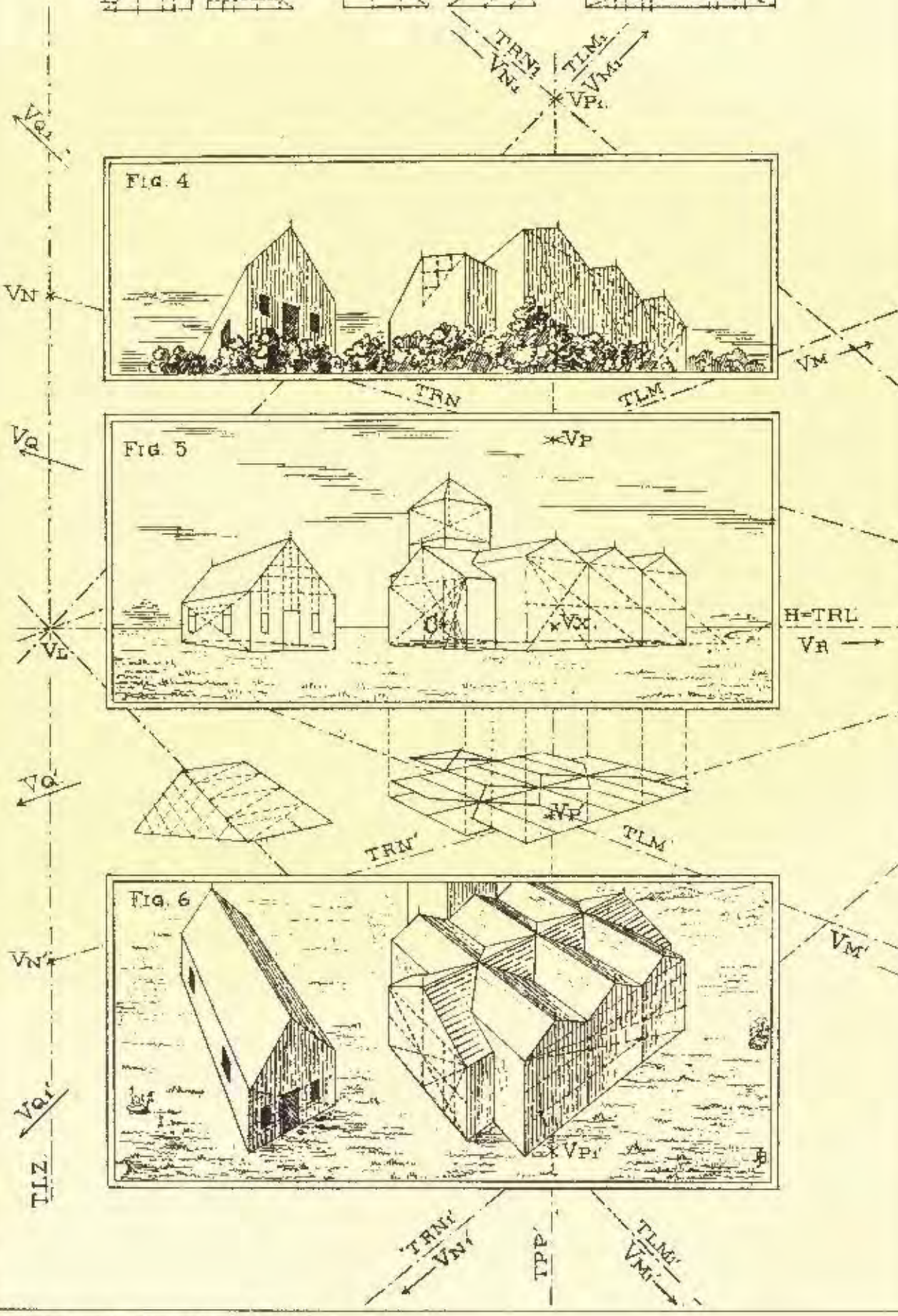
Perhaps the worst sin against good taste is the frequent mention of the author's friends, and the way in which he constantly drags them before the public. There is scarcely a page in the whole volume on which Mr. Marsh's or Mr. Lathrop's name does not appear, and with praise little less than fulsome. What are those who live beyond the pale of New York to think of Mr. Sypher and his bric-à-brac, emancipated from the pawnbroker's shop? How are Cottier and others to supply the immense demand for cabinets, chairs, and stuffs, that would naturally spring from so flattering a notice as this? On one page his friend's beautiful drawings are recommended to us, and on the next the lovely chintzes and algriennes of Miol and Colinshaw. Messrs. Cottier, Marcotte, and Herter are sedulously recommended, although their beautiful

[1] The House Beautiful. Essays on Beds and Tables, Stools and Candlesticks. By Clarence Cook. New York: Scribner, Armstrong, & Co. 1878.

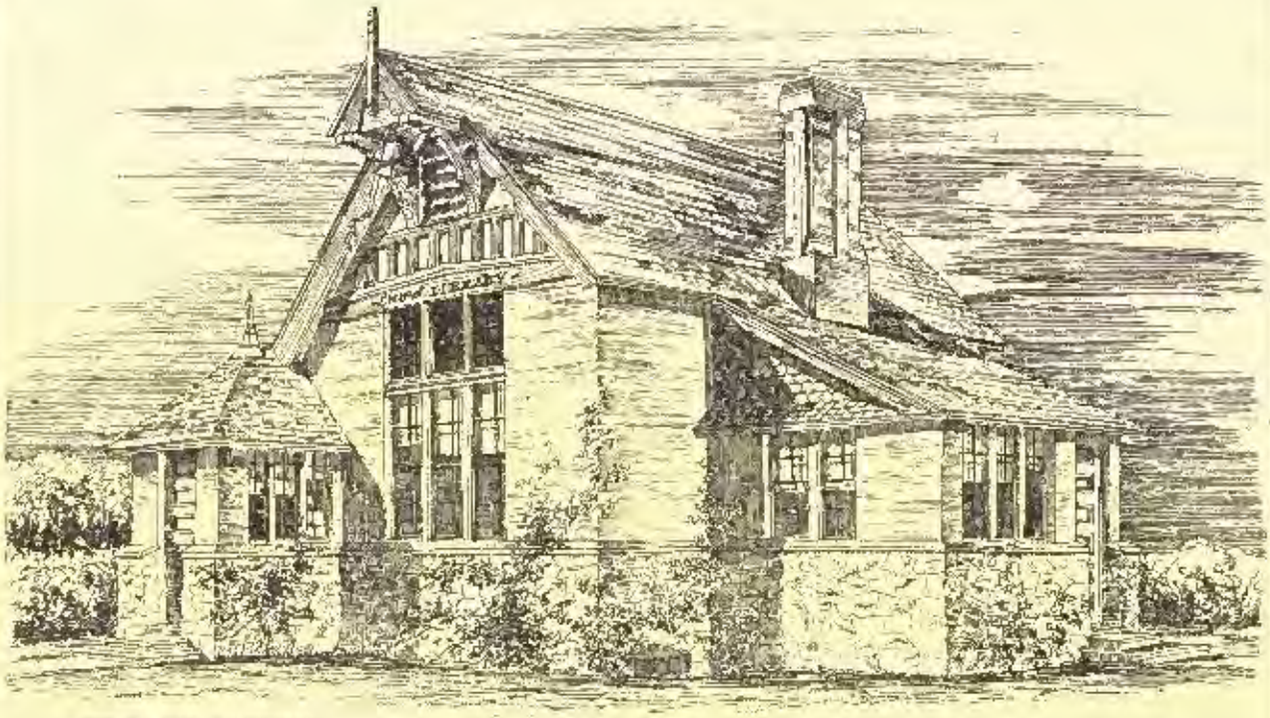
PLATE II. THE PERSPECTIVE PLAN. USE OF DIAGONALS.

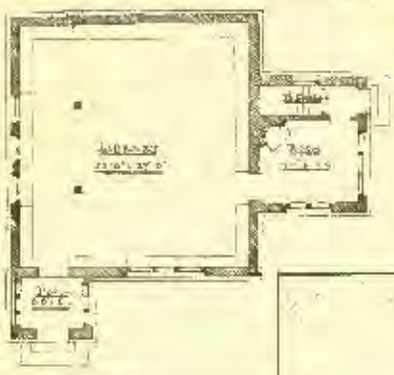
FIG. 3.





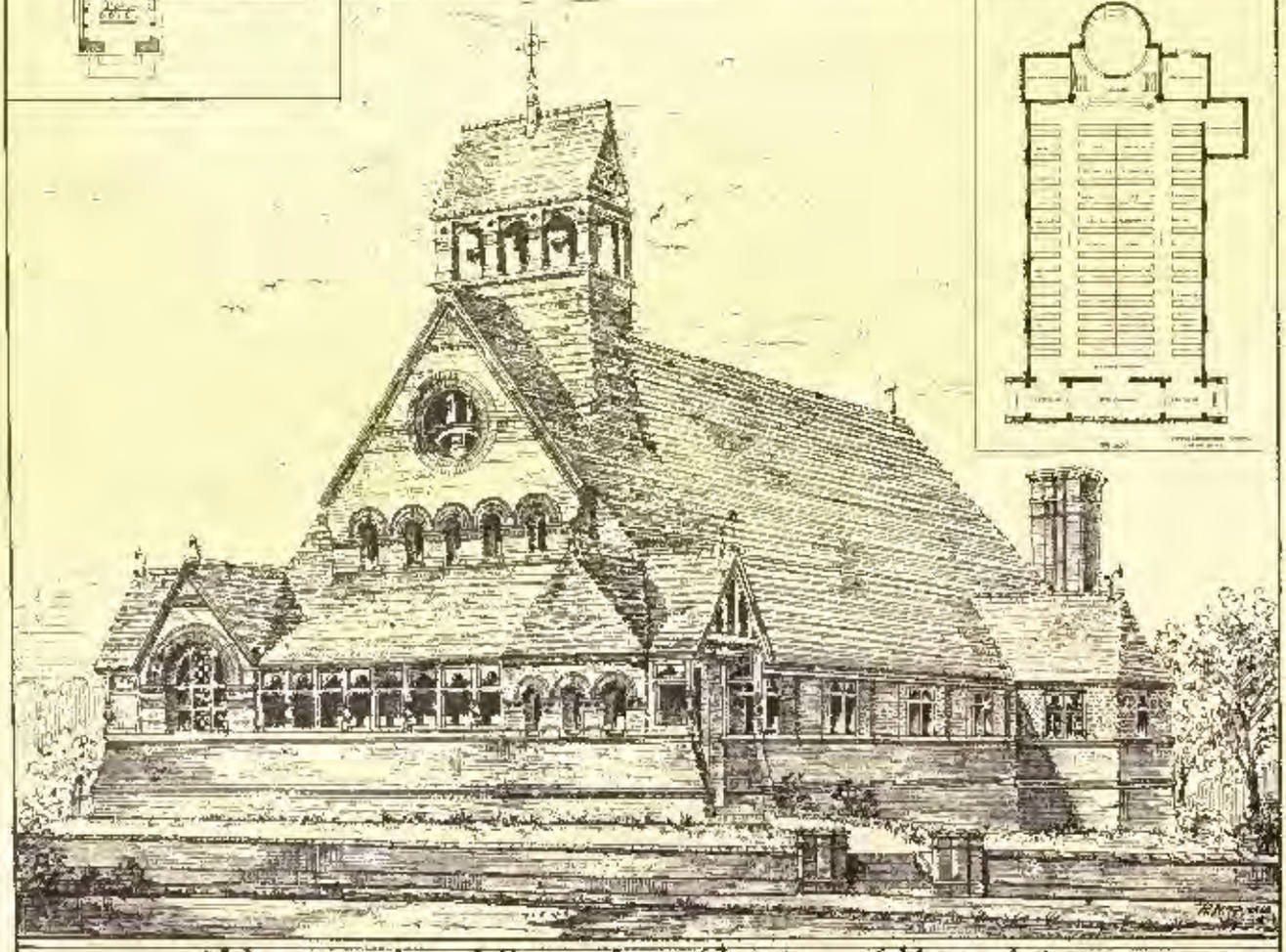
THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON





SNOW LIBRARY AT ORLEANS MASS.

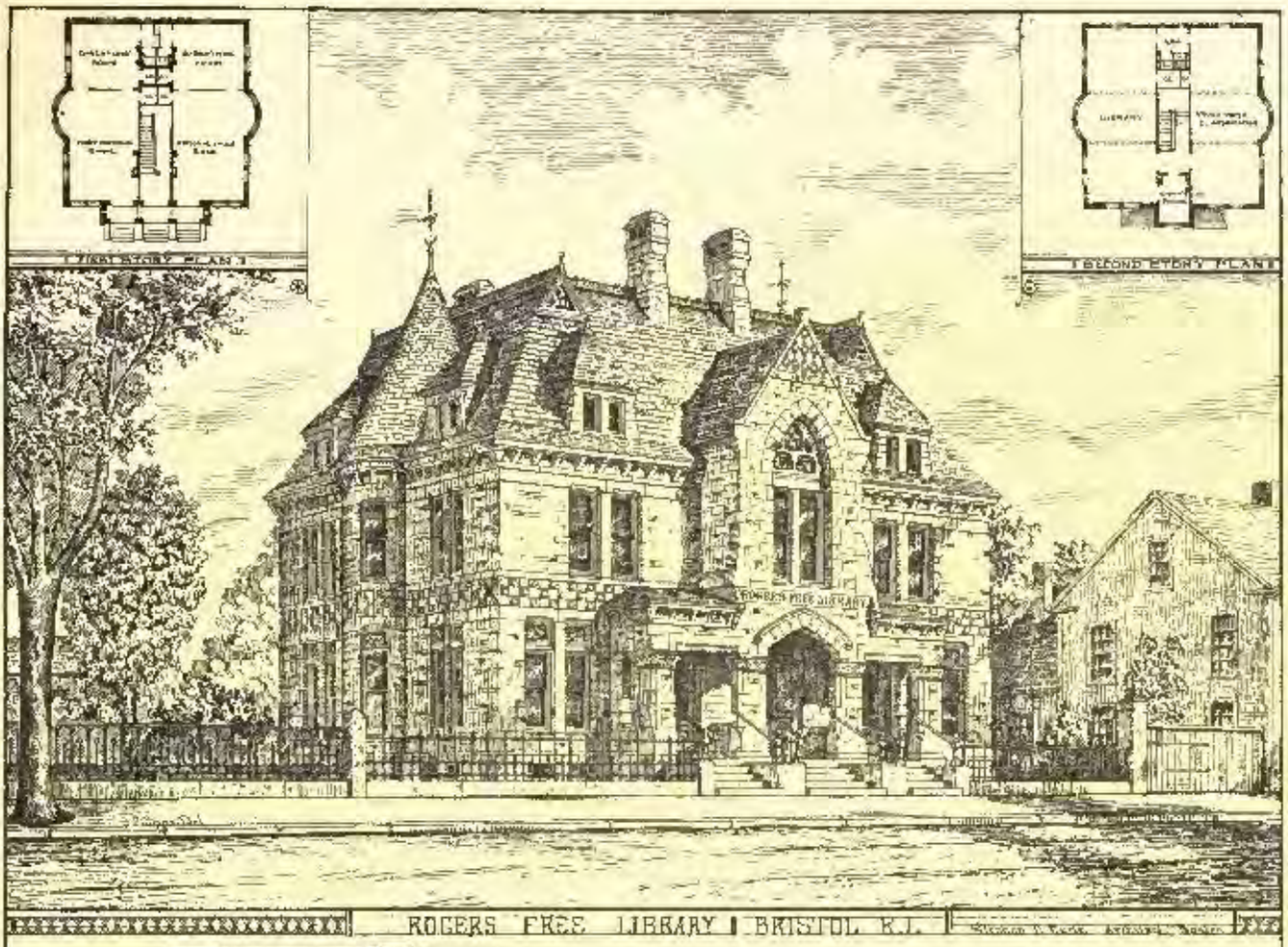
CABOT AND CHANDLER ARCHITECTS.
BOSTON MASS.



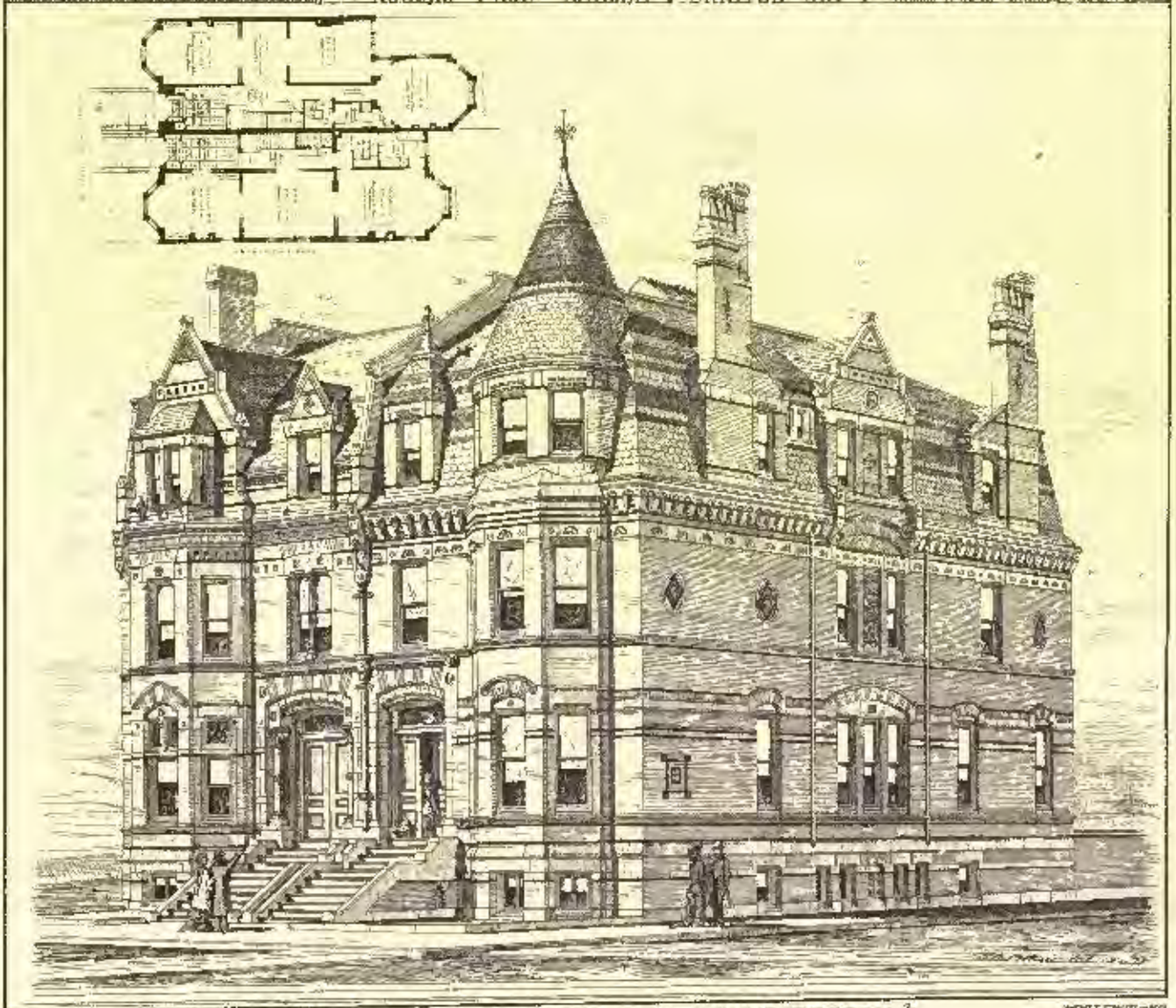
Perspective View of a Country Church

THE HELIOTYPE PRINTING CO. 220 Devonshire St. Boston.

POTTER & ROBERTSON ARCHITECTS NEW YORK



ROGERS FREE LIBRARY | BRISTOL R.I.



TWO HOUSES-COMMONWEALTH AVENUE, BOSTON.

DESIGNED BY H. C. MEYER

designs and exquisite taste in decoration are beyond the limited purses of those to whom this book is specially addressed; nor are many so fortunate as to number among their friends so skilful and ingenious a carpenter as Mr. Matt Miller. In short, after going over this book with its curious compound of moderation and pretence, of good, bad, and indifferent subjects superbly illustrated, of common sense and literary foppery, the reader is tempted to quote to the author a sentence from his introduction, which, if not a guide to beauty, is at least a sound warning against vagaries: —

"If I am pushed to the wall with a question as to my right to be heard in this matter, I can only say that after much tribulation I have reached a point where simplicity seems to me a good part of beauty, and utility only beauty in a mask."

THE ILLUSTRATIONS.

SNOW LIBRARY AT ORLEANS, MASS. MESSRS. CABOT AND CHANDLER, ARCHITECTS.

MR. DAVID SNOW left $5,000 for the purchase of books, on condition that the town of Orleans would put up a permanent building. The town voted $2,000, and $1,000 more were subscribed by former residents of the town, students of the academy which had stood on the site selected for the library. The main building measures on the outside 28 feet by 30 feet, with a projection of 12 feet by 16 feet for the librarian's room, and stairs to cellar. It is hoped the bell of the academy may be found, and hung in the projection of the front gable. The library is one story, high enough for a gallery, with open timber roof. The construction is a wall of pasture stone, five feet from ground, upon which is a nine-inch brick wall, with an inch air-space, the offset being covered with North-River stone. There is a cellar under the whole of the building. The cost was $3,200, and Mr. J. B. Wilson of Charlestown was the builder.

ROGERS FREE LIBRARY, BRISTOL, R.I. MR. STEPHEN C. EARLE, ARCHITECT.

The walls of the building are of Longmeadow brown stone, in rock-face broken ashlar work, and the inside is finished throughout in ash. The building is the gift of Mrs. M. DeW. Rogers, and has been erected at a cost of $15,000. Only the upper story is at present to be used for library purposes, the lower story being leased to banks.

HOUSES ON COMMONWEALTH AVENUE, BOSTON, MASS. MR. W. W. LEWIS, ARCHITECT.

These houses are built of brick, with sills, caps, belts, and other finish of Chicago terra-cotta.

PERSPECTIVE STUDY FOR A COUNTRY CHURCH. MESSRS. POTTER AND ROBERTSON, ARCHITECTS.

PERSPECTIVE STUDY, PLATE II.

See the "Paper on Perspective" in this number.

PLUMBING IN AN AMERICAN CITY DWELLING.

This section of an American city dwelling, which shows an arrangement of plumbing and waste pipes having specially in view the exclusion of noxious gases, may serve at once as a diagram and as an outline specification for first-class plumbing-work. Nowadays an architect can hardly assume that he has done his whole duty to his client until he has, either unaided or in consultation with a competent sanitary engineer, planned the arrangement of all plumbing-work; and this drawing suggests the practical utility there would be in adding to the ordinary drawings of a house a "quarter-scale" drawing, showing the arrangement of plumbing and draining.

A is a vent-pipe for the escape of gas from the sewer, should the trap E be forced by back-pressure. B is a four-inch pipe. The traps emptying into it are an inch and a half in bore; and it is not deemed necessary to ventilate them separately, as shown at D and at the basins at C.

C is a six-inch pipe, into which a four-inch water-closet trap empties on one side, and, on the other side, an inch and a half trap from the basin. The basin-traps are ventilated by a pipe entering the main ventilating-pipe just above the slop-sink No. 13.

D is a six-inch pipe, which has a four-inch inlet, and hence can never be filled by the inflow, intended to carry off the rain-water and the waste from the butler's pantry and servant's water-closet, each of whose traps is separately ventilated by a pipe branching into the pipe A', which is also a vent for the main pipe D.

G is a fresh air or ventilating shaft, which has its opening at the curb covered by an iron grating, which can be concealed by a hollow carriage-block with perforated sides, in which a basket of pulverized charcoal can be hung, if desired, although its distance from the house would preclude the possibility of any offensive smell entering by the front-windows. This pipe G is also intended as a vent for gas when a column of water or solid matter is coming down the main pipes, and precludes the possibility of the traps up stairs being forced by back-pressure. It will be noticed that the main waste-pipe passes out under the cellar-floor but along the cellar-wall, where any defect or leakage can be easily discovered.

No. 1 is a three-inch double-acting pump of the improved pattern, made for house use by, say, Carr, Coleman, or Baxter, to be used when the head of water is not enough to raise it to the tank.

No. 2 is a laundry range, with a forty-gallon pressure boiler.

No. 3 is a set of earthen wash-trays supplied by ⅝" Fuller's patent faucets.

No. 4 is a refrigerator with waste. It will be noticed that the waste is not directly connected with the sewer, — a necessary precaution, as there may be times when ice is not taken, or the house left unoccupied; in either of which cases the trap would become dry, and the refrigerator would become foul.

No. 5 is an improved kitchen-sink made to waste through one of the legs.

No. 6 is a range with a seventy-gallon pressure boiler.

No. 7 is the servant's water-closet, supplied by a patented tank which combines an ordinary reservoir, a measuring-cistern (containing a given amount of water), and an extra large service-box. By an ingenious arrangement of valves, no water can enter the measuring-cistern from the reservoir while the handle of the water-closet is raised: so only three gallons can be used, if it is held open for an indefinite period. While on the other hand, the valve that lets water into the service-box being four inches, and the outlet to the water-closet one inch, an abundant supply is obtained, even if the handle is held up only five seconds, to flush out, and fill the bowl.

No. 8 is a planished copper pantry-sink.

No. 9 is a fifteen-inch overflow basin supplied by No. 1½ Fuller's pantry-cocks, and emptied by Weaver's basin-wastes.

No. 10 is a sixteen-ounce tinned and planished French bath-tub supplied by a double bath-cock, and emptied by Meyer's bath-waste.

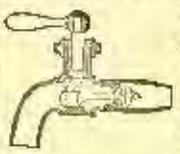
No. 11 is a Jennings all earthenware water-closet, which is too well known to need description, arranged for and supplied by the cistern described in No. 7.

No. 12 is a fourteen-inch marbled basin with No. 1 Fuller basin-cocks, with basin-plug and chain-stay.

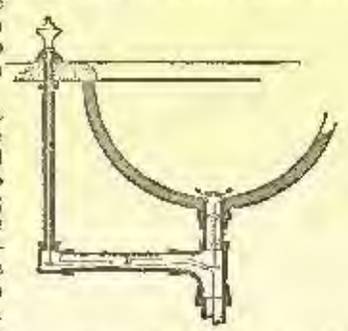
No. 13 is a slop-sink with self-closing cocks.

No. 14 is a cast-iron tank, supplied from street main through one-inch Fuller-Meyer patent tank-regulator, or by the pump No. 1.

[The peculiarity of the Fuller faucets is, that they shut off by means of a tapering, elastic plug, which has its end protected by a metal shield, and is drawn to a seat by an eccentric. It will be noticed, that, closing in the direction of the flow of water, the pressure of the water itself tends to keep them tight. The composition of which the elastic plug is made is specially prepared to be durable in hot water. The strain on the valve is restricted by the movement of the eccentric, which feature adds greatly to the durability of the faucet. As the water is entirely excluded from the chamber of the cock when closed, the faucet cannot be injured by the freezing of the pipe. The body of the cock can be unscrewed from the shank, so that new plugs can be put on when repairs are necessary.



The Weaver basin-waste is a simple contrivance to take the place of the ordinary plug and chain. By pressing on the knob R, the lever L lifts the stopper; by a slight turn to the right, the knob is held in place; by releasing the knob, the weight of the stopper causes it to drop into its place. The wings on the stem of the stopper serve as a guide and also a strainer: when choked up, it can be lifted out, and cleaned.



The improved bath-waste consists of a large cock, having an inch and a half hole through it, that can be shut off by a quarter-turn of the handle. This cock is attached to a connection which is soldered in the bottom of the tub, and facilitates very much the plumber's work in setting the bath-tub. A plate on the foot of the bath indicates the position of the cock.

The double bath-cock referred to is made so that it can be taken apart for repairs inside the bath, without disturbing the connections. It is virtually two Fuller cocks, — one delivering hot, the other cold water through the same outlet: when both hot and cold water cocks are delivering together, the temperature of the water can be adjusted as desired. Thus the bather is not obliged to

stand until more hot or cold water is let in to make the temperature of the water suitable. By screwing a coupling into the nozzle, to which is attached hose and sprinkler, a shower or shampoo can be obtained, less severe than the old-fashioned shower from overhead.

In this connection we will also draw attention to an arrangement of plumbing which is proposed by Col. G. E. Waring, jun., and is explained by the accompanying cuts.

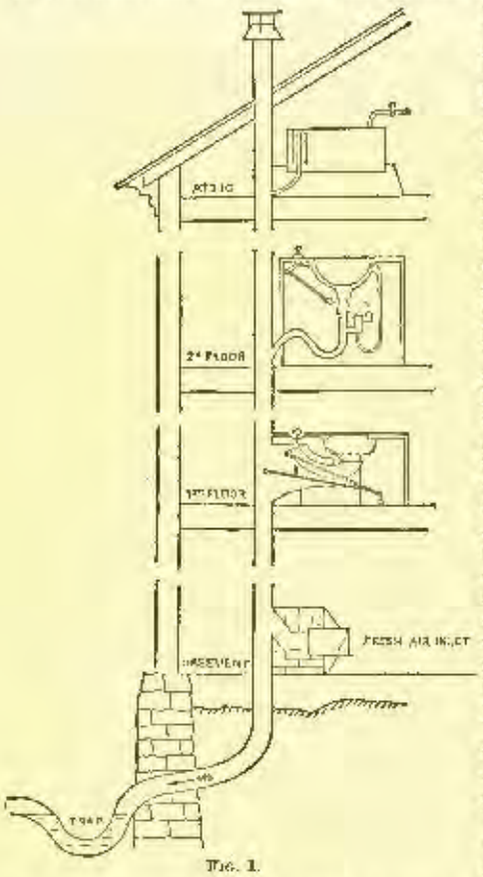


Fig. 1.

In Fig. 1 the soil-pipe is shown to be separated from the sewer by a water-trap outside the wall of the house,—the sewer is supposed to be ventilated independently. At the lowest convenient point fresh air is admitted to this soil-pipe, which rises through the roof, and is capped by a ventilating cowl. On the first floor is shown a water-closet which discharges directly into the soil-pipe.

The peculiarities of this water-closet are an earthenware bowl F, Fig. 2, which is supplied with water from a service-box; a flexible rubber tube A, which is supported in the position shown by the end J of the lever B, which has for its fulcrum the pivot O, which, as it passes through the sides of the soil-pipe, is

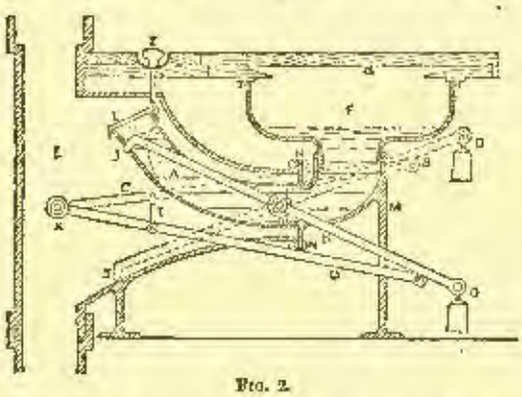


Fig. 2.

surrounded by packing-boxes to guard against possible leakage of sewer-gas. The lever is counterpoised by the weight D, and is actuated by the lever C which has its fulcrum at K, and to which the power is applied at J by the handle of the water-closet. The dotted lines show the action of these levers. L is a brass valve ground to its seat, and is air-tight in every position when the water is not actually flowing through it. This is the only point at which sewer-gas can make its entrance into the water-closet. E is a portion of the soil-pipe chambered out so as to admit of the rising and lowering of the levers and the rubber tube. This arrangement allows the water contained in the bowl and tube, which is much greater in volume than in ordinary water-closets, to be discharged almost instantaneously into the soil-pipe, carrying with it all fæcal matter, which, as it bears so small a proportion to the containing water, can hardly stick to the sides of the soil-pipe as it descends.

On the second floor, Fig. 1, is shown a set basin,—here taken as a type to represent basins, tubs, sinks, wash-trays, etc.,—which is provided with check-valve and waste-plug as shown in Fig. 3. This basin has an overflow pipe F trapped at L, and made impervious to sewer-gas by the check-valve shown in detail in Fig. 4, where B is a brass valve ground so as to make an air-tight joint with its seat, and light enough to allow any overflowing water to raise it. The entrance of sewer-gas by the waste outlet in the bottom of the bowl itself, Fig. 3, is prevented first by an ordinary S-trap, and next by the plug B, which closes with an air-

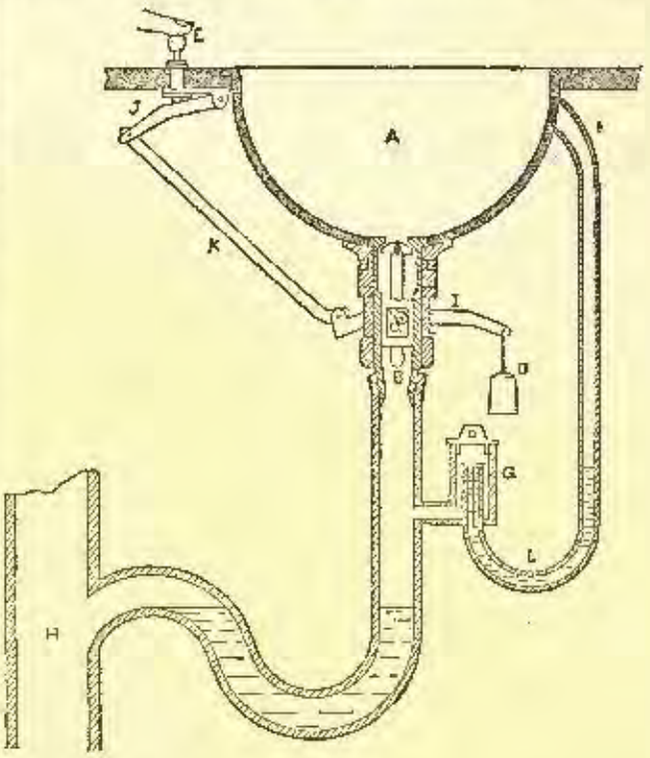


Fig. 3.

tight joint against the brass seating at the outlet. By the action of the weighted lever I, this plug constantly closes the waste outlet, whether the bowl be empty or full; and it is only at the time that water is actually flowing through the waste-pipe that the valve is open. To open the valve and empty the bowl it is necessary to press constantly upon the knob E, thus applying power to the short lever J, which is connected by a rod K to the lever I counterpoised by the weight D. Immovably connected to this last lever, at its fulcrum, and turning with it, is a short lever or cam C, which raises or lowers the plug B. It is to be observed that the action of sewer-gas, supposing that any were to penetrate as far as any of these valves, would be simply to close them more tightly.

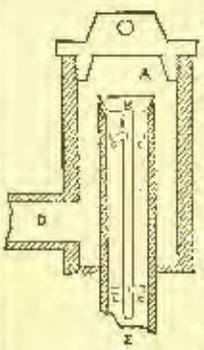


Fig. 4.

In the attic is shown a flushing tank, arranged to fill at regular intervals, and then automatically send a cleansing flow of water through the soil-pipe. The tank here indicated is Field's Flush Tank (see *American Architect and Building News*, No. 101), but a tumbler tank would fulfil the same purpose.

REPORT OF THE ELEVENTH ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.

[Held at Boston Oct. 17, 18, and 19, 1877.]

SECOND DAY'S SESSION, OCT. 18.

The Convention was called to order at ten A.M., the President being in the chair.

Mr. Robert Briggs, C.E., Corresponding Member, read a paper on the Relations of Moisture in the Air to Health and Comfort; in which he discussed at length the effect of the hygrometric condition of the air in connection with climate, temperature, and ventilation, and argued the disadvantage to health of a difference in hygrometric condition between the air in houses and that outside, opposing the practice of artificially moistening the air introduced in heating buildings.

Mr. McArthur mentioned the influence upon the air of a room of an aquarium of about eight superficial feet of surface. He had been obliged to discard such an one because guns and other iron objects kept in the room with it had become reddened with rust, not while the room was artificially heated, but in summer, from air coming in through the windows. He inquired what would be the effect upon air at a temperature of say seventy-two degrees of such a water-surface. He recalled his experience in

passing a winter on the table-lands of Mexico, where the air was excessively dry, so that meat dried up without putrefaction, and the inhabitants were in the habit of lying down on the ground wrapped only in their *serapés* or blankets, and sleeping at any time at night or all night. In this dry climate the prevalent diseases were heart-disease and rheumatism.

MR. BRIGGS thought that from such a water-surface as Mr. McArthur mentioned the amount of evaporation would be small, probably not more than a gallon a day, unless a large quantity of dry air were introduced into the room. Probably the amount absorbed would be from one-tenth to one-eighth of a grain for every cubic foot of air introduced.

On motion of the Secretary, the thanks of the Institute were voted to Mr. Briggs for his paper, which was referred to the Committee on Publications.

COL. GEORGE E. WARING, JUN., C.E., Corresponding Member, then read a paper on Sanitary Science,[1] in relation to house drains and their ventilation. The thanks of the Institute were voted to Col. Waring, and his paper was referred to the Committee on Publications.

In the discussion that followed the paper, Mr. McArthur asked whether there were any means of ventilating the public sewers of Boston, citing the example of Philadelphia, where, some years before, when he was putting up a very high building, the city engineers had asked permission to have a tall flue built in it and connected with the sewers, in order to ventilate them.

The President called on MR. E. S. PHILBRICK, C.E., of Boston, who was present, for information on this point, and for remarks on the subject of the paper.

MR. PHILBRICK said that the whole present system of sewerage in Boston was patchwork, which had grown without uniformity during the last two generations, and was a fair sample of the degrees of imperfection with which the whole subject of drainage had been treated throughout the country, and, in fact, throughout the world. There were some thirty or forty independent outlets into tide-water, many of them submerged by the tides, which had a range of from ten to fourteen feet. There was scarce any systematic attempt to relieve the sewers of the pressure exerted on them by the influx of tide-water. About two years ago, the sewer department had issued an order to householders to connect their eave-gutters with the sewers, partly with a view to get rid of the rain-water rushing over the sidewalks and street-gutters, and partly to ventilate the sewers through the spouts; but he thought little had been done to carry out the order. He thought there were no connections with any tall tower or chimney, nor did he think that such relief was of any value; for the amount of air that could be carried up any chimney likely to be built would be entirely inadequate to change the air in any considerable length of sewer. This ventilation problem was still far from being solved. The common method was to leave man-holes at every street-corner, with perforated covers, in order to have so many ventilating openings that the escape of bad air from any one would be insufficient to do harm.

The plan which had been undertaken in Boston was to carry a large intercepting sewer round the south side of the city, gathering all the sewage and carrying it out into the harbor, where it would be delivered in deep water on the ebb-tide, so as to pass out to sea. This seemed to be accepted here as the necessary way of disposing of sewage. All the efforts made at great cost in England, for utilizing sewage by exhausting its noxious elements, had proved futile as far as economy was concerned, except where the sewage could be directly applied to the land for agricultural uses. This was impracticable in Boston, for lack of accessible land, however it might prove in other towns in the Commonwealth. It had been known, for many hundred years, that the proper way of disposing of effete matter is to return it to the earth to nourish vegetable growth; but the means of accomplishing this had never been sufficiently discussed.

In confirmation of Col. Waring's remark concerning the apathy of our people, he heard it said every week that since people had endured the present arrangements for some years, and perceived no harm from them, there was no need to be anxious about them. It was to be remembered, however, that while the sewage emanations were only one out of several factors necessary to produce disease, and a vigorous constitution might in nine cases out of ten resist them, they certainly could be traced as one predisposing cause of disease, which it was therefore our duty to eliminate if possible. The means for that elimination devised by different minds were extremely various. Doubtless most of them had merit, and were more or less adapted to particular cases; but till the whole subject had been intelligently studied it would continue in its present chaotic condition. He thought that the apathy had begun to yield a little among plumbers. After hammering away at the subject for four or five years, with Col. Waring and others, he found the fact beginning to be recognized that a soil-pipe ought to be carried up through the roof. He thought that still it was omitted in more than half the houses built in Boston this year; and he had talked within a month with many plumbers who thought it a humbug, such was the tendency among all artisans to run in ruts, and such the difficulty of introducing a new idea when men think they have done well enough if they have done as their fathers did.

One other point to which he thought it desirable to allude was the disconnection of the house-drainage from the sewer or cesspool, a thing easier in a milder climate, but possible in ours. By this he meant not merely interruption of the connection by a trap, but a free ventilation of the house system. The soil-pipe should not only run up through the roof, but should have free access of air from below through an opening outside the house wall; otherwise every descending column of water from the upper stories would drive the air in the pipe before it, especially if it was confined by a trap at the sewer, and force it out through the traps in the lower stories. This had been done probably in not more than one per cent of the houses in Boston. He was sorry to say that in the neighboring city of Cambridge an ordinance compelled every man to have on his own ground a depository of filth where it could be kept for more complete putrefaction directly under his own nose. Another thing of the same sort was the ordinary cylinder-trap. It would hold a quart or two of matter, which in the course of a week became horribly putrid; and the flow through it occupied so little of its calibre that the rest was necessarily filled with grease and other deposits from the waters.

MR. STONE requested more precise suggestion as to means of breaking the connection between the pipe and the cesspool as this proposition required, a thing which it was difficult to manage in a climate so cold as ours. In Providence their system of sewerage required that there should always be a trap between the house and the sewer, and a connection with the spout from the roof; and that the soil-pipe should be carried up through the roof, so that there was a circulation of air through the roof. There was no direct provision for ventilating the sewers other than the man-holes mentioned by Mr. Philbrick, but the engineer had recommended that in public buildings, and if possible in private houses, in the higher parts of the city, there should be flues connecting with the sewers, which would be, as had been said, but little help, yet some help.

MR. PHILBRICK thought the best means of breaking the connection between the house-drain and the sewer, in our climate where it was necessary to put the work about five feet below ground, was to introduce a trap outside, with water-seal, of any approved form, the simpler the better, and the smaller the better provided it would carry the volume of water with which it was taxed, — one without square turns or corners to accumulate solid matter; and then to connect the house side of the trap with the open air, which might be done by a pipe carried up to the roof, near the chimney. He objected to the use of the down-spouts to ventilate the drains. This did very well in fair weather, supposing that the upper ends did not open near windows; but if it rained, the water descending by the spouts produced by its own entrance into the drains a pressure of air which must find vent. It was often argued that there would still be an ascending column of air in the centre of the pipe; but this was not the fact, the water descending in a spiral against the walls of the spout with an accelerated velocity, carried a column of air with it, so that during a rain the spout could not act as an upcast pipe, and another must be provided. Moreover, whenever water was discharged from the soil-pipe it drove the air before it, and drew after it another volume of air from the sky, and for this action too a vent was required. For country houses where there was ample room he had provided such relief at a short distance from the house. He had made a vent in the drain-pipe, opening it directly into a little well or manhole, walled in with dry stone, which ought to go down four or five feet, or under some circumstances deeper than that. The gases driven out from the drain were then absorbed in the ground without coming to the surface, and he had not found any inconvenience or any perceptible odor from them.

COL. WARING said that the method described by Mr. Philbrick had been much discussed in England, and had been accepted as the only valuable one. But in our climate there was some danger of freezing. It had been his habit, in the case of country houses, to carry the vent-pipe away some distance through the ground, that the warmth of the soil might have an influence upon it. In one instance he had carried the pipe across the cellar, that the air there might warm it, and then through the ground into the back yard.

MR. HARTWELL suggested carrying the pipe into a chimney-flue, provided there were no openings above from the flue into rooms. Mr. Cabot thought this dangerous, because of the risk of down-draughts into the rooms below, which were always likely to occur. He had always avoided this method. Mr. Philbrick objected that it was very difficult to maintain a close joint between a metal pipe and a brick flue. The expansion and contraction of the metal always broke the mortar in the joint, and it was impossible to keep it tight. Col. Waring suggested that the pipe might be turned into the flue, and carried up without a break.

Unfinished business was then taken up; the first subject of consideration being the report of the Trustees in regard to the position of honorary members. The President read the portion of the report referring to the subject.

MR. RICHARDSON thought that the Trustees had full power to take what steps were necessary, under Section 9 of Article 1, of the By-Laws.

[1] See *American Architect*, No. 94, Nov. 10, 1877.

He was himself familiar with the circumstances in only one of the cases mentioned in the Trustees' report, — that of a gentleman who had been elected an honorary member in 1867, he being then one of a firm of architects in full practice: since then his attention had been turned mainly to landscape-gardening, and he was now less concerned with the practice of architecture than at any previous time within the past ten years; and Mr. Richardson thought it a hardship, in the case of this gentleman, to strike his name from the Institute roll without notice, by reason of a disqualification which had existed at the time of his election, and had continued to exist during the ten years since.

Mr. Haight suggested that under the By-Laws the only thing which the Trustees were authorized to do, in case of any infraction, however slight, of any of the articles, was to request the parties to resign; and that the attention of the Board having been called to certain irregularities, they were obliged to notice them, and, not considering that it was advisable to resort to the harsh measure prescribed for them, they preferred to come before the Convention and ask them what had better be done, and, if desirable, to request the Convention to make such order as they saw fit. He thought it would be well to refer the subject back to the Board of Trustees, with full power to act. Mr. Richardson agreed, and Mr. Haight presented the following resolution, which was adopted: —

Resolved, That this subject be referred to the Board of Trustees with power; and when the fact is brought to their notice that an honorary member of the Institute is deriving emolument directly or indirectly from the practice of architecture, that the Trustees be directed to take such action in the matter as shall be to the best interest of the profession.

The President next called the attention of the Convention to the portion of the report of the Trustees relating to the Washington Monument, which he read, and also portions of the reports from the Boston, Rhode Island, Baltimore, and Philadelphia Chapters, relating to the same subject.

Requesting Mr. Cabot to take the chair, the President made some remarks, quoting from the report of the commission appointed by the War Department to examine the foundations of the Monument, in confirmation of the opinion expressed by the Board of Trustees as to their insufficiency.

In explanation of the apparent inconsistency between the suggestion of the Philadelphia Chapter that designs should be invited for completing the Monument from all who desired to compete, and the uniform effort of the Institute to break up the system of general competitions, he said that the Philadelphia Chapter considered that in the case of a work so strongly appealing to the patriotism and interest of the whole country, every American qualified to make a design of that character would feel it not only a privilege, but a right, to be allowed to offer such thought and talent as he might be able to embody in a sketch, as a free gift for the service of his fellow-citizens.

When the Monument came to be built, it would have to be built from detailed plans, probably in accordance with some one of the sketches sent in; and it was the most natural course to employ the author of the sketch to develop his idea in detailed plans, and to watch over their execution; and for this service, which would be at a considerable sacrifice of time and money, the designer should be paid.

In regard to the selection by which the country should be sure of obtaining in the end the best design, the President spoke of the suggestion of the Philadelphia Chapter that three engineers of the War Department should be associated with three members of the Institute; saying that in his opinion, the relations of architects with engineers might be more cordial than they are, and in this particular case, that the engineers of the Department constituting formerly the Topographical Bureau were well educated in the theory of architectural design in their West Point course; mentioning that the plans sent in by them, by order of the Department, for the extension of the Capitol, were superior to nine-tenths of those submitted by architects. In construction, of course, they were fully our equals, and the Philadelphia Chapter could not see why it would not be an honor and a benefit to the architectural experts to have the co-operation of an equal number of such highly trained engineers.

The President continued, that although he had brought forward these considerations, so that if the Institute were to take any action in the matter, the resolutions of the Philadelphia Chapter might be regarded favorably with a view to their adoption by the Convention, nevertheless his own opinion was that it would be better and more dignified on the part of the Convention not to pass any resolutions on the subject whatever. He thought it undesirable for the Institute to appear to thrust itself into the matter until called upon.

Mr. Van Brunt thought the general feeling among the Chapters was in accord with that of the President, but there was a question whether the Institute, as the incorporated representative and guardian of the interests of architecture in the country, had not a duty to perform, without regard to the personal feeling of its members, in connection with the most important of the national monuments. He proposed that the Trustees should be authorized to offer the services of the Institute to the Association in some such form as was suggested in the resolution he would present, which was as follows: —

Resolved, — That the Trustees of the American Institute of Architects offer the services of the Institute to the Washington Monument Association, to assist them in considering the question of the completion of the Washington Monument in a manner commensurate with the importance of the occasion and in accordance with the interests of art.

Mr. Cabot and Mr. McArthur expressed opinions similar to those of the President.

At the request of Mr. Stone the resolutions adopted last year were read.

Mr. Ware moved the previous question on Mr. Van Brunt's resolution, which was lost. The whole matter was then, on Mr. Ware's motion, indefinitely postponed.

NOTES AND CLIPPINGS.

Fall of a Wall. — Early on Sunday morning, Feb. 2, the person having the charge of the Seventy-first Regiment Armory, at the junction of Broadway with Sixth Avenue, New York, noticed that one of the side walls was likely to fall out. The police were notified, and the street was hardly cleared before some thirty feet of the wall partly fell. To prevent the fall of the whole building it was found necessary to shore up the weakened wall. The building, which was built about fifteen years ago, was originally intended for a hotel, and the foundations and lower part were substantially built; but when it was decided to turn it into an armory, various changes were made which weakened the walls. The coping of the main wall on the Broadway and Sixth Avenue fronts was carried up some three feet above the gutter, so that ice and snow laid in it continually in winter, and the pressure of a snow-slide from the mansard roof is thought to have been the ultimate cause of the accident; but it is also said that the roof and gutters were in very bad order, and had caused the walls to become badly water-soaked.

The Cape Cod Ship Canal. — The Committee on Harbors of the Massachusetts Legislature have begun a hearing relative to cutting a ship-canal across Cape Cod. This canal, if the enterprise succeeds, will be 7⅞ miles long, and 18 feet deep at low water at the south end. The estimated cost is 2,000,000.

The Committee on Harbors has lately received the following remarkable communication: —

No. 52 Spencer Street, Rochester, N.Y., Feb. 2, 1878.

Committee on Harbors Massachusetts Legislature.

Gentlemen, — I have seen it stated in New York papers of the 29th ult. that you are considering the project of cutting a ship canal across Cape Cod, the estimated cost of which is $2,000,000. Before deciding on that work, I respectfully ask you to examine a new project of mine, intended for the same purpose as a ship-canal, but capable of construction much cheaper. The idea has been approved by eminent engineering authority as applicable to the Isthmus of Panama. It is to carry the vessels across in a tank containing water to float them, the tank to run on a massive railroad. At each end of the track it would descend in the harbor, the tank running down until the water in it was on a level with the ocean. It (the tank) would be opened by suitable gates, and the ship received or discharged. This plan can be made as effectual as a canal, and the advantage in first cost is so greatly in its favor that it must secure your earnest consideration. Very respectfully yours,

Edmond Robinson.

Theatre Burned. — On Feb. 5, at one o'clock in the morning, the Academy of Music at Chicago was burned.

The English Obelisk. — A site has been chosen for the Cleopatra obelisk on the Thames Embankment at the top of the Adelphi steps, between Charing Cross and Waterloo Bridge.

Sketches of Manchester. — A series of sketches, architectural and general, is shortly to be published in England. These sketches are taken from the sketch-books submitted for the prizes given by the Manchester Society of Architects. The subjects are found in Manchester and its vicinity only.

Rendering Portland Cement Concrete Water-Tight. — With reference to the discussion in recent issues of the *Journal* on the question of Portland cement concrete, our Glasgow correspondent quotes the experience gained by the practice at the Rothesay Aquarium. He says: "Concrete tanks can be made practically water-tight by first using a good stiffish body of concrete, composed of just such proportions as should be used in order to make a good job, judging by the quality of the cement. Use clean sand, thoroughly free from soil, and then give a coat, one inch in thickness, of pure cement, finished and *polished* as hard as possible. By adopting such a course of procedure the tank is practically water-tight. This is what was done in the large reservoir-tank at the Rothesay Aquarium, and it succeeded famously, whereas under the ordinary method it leaked like a basket." — *Journal of Gas-Lighting.*

An old New England House. — One of the oldest houses in New England is said to be in Guilford, Conn. It was built in 1639. Another and possibly older house, for the date of its building is said by some to be 1634, is Gov. Cradock's old brick mansion in Medford, Mass.

An Architectural Model. — A model of the New York Post Office, on a scale of one thirty-second of an inch to the foot, is exhibited in a Broadway window. It was built from the plans, contains 284,000 pieces, and occupied the time of one man working six hours a day for eight years. It is intended for the Paris Exposition.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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BOSTON, FEBRUARY 16, 1878.

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THE appointment of Mr. William W. Story as one of the nine Expert Commissioners at the Paris Exhibition is one of the good selections of the Executive. No American is better qualified by cultivation, experience, position, and familiarity with European languages and customs, and personal acquaintance with men whom he will be called on to meet there. All these things tell — much more than the politicians imagine who are ready to send the first "worker" who comes to them with a claim to represent us abroad — in giving position and efficiency to those who have to take charge of our interests among foreigners, as well as in doing credit to those who send them. There is no department of the Exhibition in which they will tell more than in the fine arts, and none for which it would have been easier to find an incompetent commissioner. No doubt Mr. Story will do us credit in this department: whether our exhibit will do so, remains to be seen. A sub-committee on art has been organized in New York, of which Ex-Gov. Morgan is chairman, and Mr. J. W. Pinchot is secretary. Mr. Pinchot has been highly commended for good service in the fine-art department at the Philadelphia Exhibition. The committee, without waiting the tardy movements of voluntary contributors, and possibly with a shrewd desire to secure a vantage-ground from which they can fulfil the necessary duty of selection, and of rejection of the impracticable contributions which are sure to come whether suitable ones do or not, have sent requests for pictures to a large number of artists, some fifty or sixty of whom have already promised to exhibit. They have wisely determined to have no exhibition of the pictures before they are sent to Paris. We have not yet heard of any serious preparation for an exhibition of architectural drawings. Considering how partial and inadequate the display was at Philadelphia, where it was much easier to provide one, it is perhaps not likely that much will be done to secure a good one at Paris. And remembering this last exhibit, we may candidly say, in spite of its good points, that we do not see in it any great encouragement for setting our productions as yet in competition with those of the architects who are likely to be represented in the coming Exhibition; the more so, inasmuch as it is difficult to secure a salutary exclusion, and because it is probable that not a great many of our architectural exhibitors would be there to profit by the comparison.

As for the general prospect of the American exhibit, the Commissioner General hopefully announces that it will be creditable; a word which may be used to mean a variety of things, without any of them being exactly what it says. As a matter of fact it can hardly be expected that after Congress had shirked and boggled over the simple duty of providing for it, till a year or so had slipped away, any thing more than a very slender American display can be got together; we may only hope that the diminution of it will be in quantity and not in quality. The fact that the delay of the Government had left but a very small space in the Exhibition assignable to the United States, will encourage selection; and we are told that there is not nearly room enough in some departments — the machinery for instance — for all that is offered even at this late hour. Two ship-loads of exhibits will sail on the 25th of this month, it is said. The French Government has notified our commissioner that the police of Paris will not be able to furnish protection for the American display, and has recommended that we send a military force for this duty. Unfortunately the standing army of the United States is not large enough to detail a squad of soldiers to mount guard over it, and so the Secretary of the Navy must come to the rescue with the marines.

A SINGULAR accident startled the people of London a short time ago. A large new building on a great thoroughfare, the Haymarket, suddenly fell all to pieces, carrying with it an adjoining house, whose occupant it buried and killed. The building stood at the corner of the Haymarket and Panton Street, was the work of a skilful architect and of a good builder, and apparently of excellent material and workmanship. It was six stories high, of stone and brick, with a considerable front on each street, supported on iron columns and girders, for shops; and at the time it fell, the roof was just going on. No sufficient cause has been established for its fall, about which opinions are divided, some persons imagining that the foundations yielded, others that the mortar was bad, others that the ironwork gave way; but there seems to be no particular evidence for any of these suppositions. What was very singular, the whole building tumbled together into its own cellar, both the walls falling inward, snapping the iron columns squarely like pipe-stems, and twisting the girders, — a fact which suggests that the first giving way may have been in the interior, since buildings are apt to fall towards the part that goes down first. Owing to the way it fell, or because no one was passing, no one was injured except the proprietor of the adjoining house. The English building journals take the occasion to read a warning against the dangers of the modern habits of iron construction; and certainly there is room for it. Setting aside the risks of constructors whose knowledge is not up to the scientific standard of the day, we are engaged — the best of us — in building-experiments as bold and as hazardous as were the men who developed the mediæval cathedrals; and apparently with no more consciousness of it. When we read that a church of the twelfth or thirteenth century fell down within fifty years after it was built, we shake our heads at the unscientific daring of its builders. Yet when we balance a huge building on the ends of a few thin columns, often with no lateral bracing, or next to none, we are using a construction as venturesome as that of the Gothic vault and flying buttress; and all the while we are experimenting with a material of whose ultimate behavior under continued stress our knowledge is as imperfect as was that of the mediæval builders concerning the principles of equilibrium on which their daring structures depended.

ANOTHER accident of a different kind, in London, brings out an example of severer application of law than we are used to here, though perhaps not severer than is wholesome. A Mr. Hackett was building a row of houses in Hackney, when one of them fell and killed a bricklayer. The coroner's inquest showed that the houses had been built with undue haste, and of inferior masonry. The District Surveyor had, while the work was going on, called the attention of the proprietor to the bad quality of the work and material, and had warned him that unless these things were mended he would be likely to find himself some day on trial for manslaughter. The proprietor (although in a singular way he combined the callings of plumber and decorator) disclaimed knowledge of building-materials, in respect to which he confided in his contractor and his clerk of the works. The clerk of the works, being called, perhaps hardly showed himself worthy of so much confidence; for he would not swear that there was concrete in the foundations, though he believed there was, nor could he tell how much loam had been put into the mortar. The coroner's jury brought in an unanimous verdict of

manslaughter against the proprietor, who was committed for trial. It does not appear that any proceedings were taken against the contractor.

The strikes in England and in Massachusetts continue apparently without change, excepting that the carpenters and joiners of London have given notice of their intention to demand the same increase of wages (to tenpence per hour) and the same decrease of time that the stone-masons have been striking for. At the same time the difficulties of the masters seem to be in some degree relieved by their importation of foreign workmen, chiefly from Germany; a resort which the British workmen look upon with truly patriotic disdain, declaring that the German masons cannot do good work. One of the builders, who was summoned before a magistrate a short time ago by a mason who claimed to be paid ninepence per hour, testified that he could get men enough and to spare at wages varying from fourpence to ninepence, from which it may be inferred that the vantage-ground of the strikers is slipping away from them. The work on the new Law Courts is still delayed, and is not up to the time demanded by the contracts. In Massachusetts the Crispin strike goes on. The manufacturers still hold to their position, refusing to deal with or recognize the Order, and insisting on treating with the men individually. A good many non-union men are at work, many having been imported from without; and there has been considerable violence on the part of the strikers. In Lynn, notwithstanding the resolutions against violence passed at the meetings of the Crispins, the disorders have gone so far as to threaten actual riot, and compel the organization of a large special police-force.

The committee appointed by the Underwriters of Chicago to inquire into the burning of Field, Leiter, & Co.'s building have made their report. The stores, it will be remembered, took fire in the garret, where the water from the engines could not reach it, and burned downwards, killing several firemen by the giving way of the staircase. The report is too meagre to give a clear idea of the building, but shows that though combustible enough, it was better protected against fire than most. It was solidly built, the roof covered with metal, was plastered mainly on wire lathing, and protected by iron shutters. It had two tanks under the roof, and stand-pipes with force-pumps and hose: whether there was any water in them or not, we are not told. There was also a Babcock fire-extinguisher on each floor. The interior construction was throughout of wood, excepting for the iron columns that supported the floors. Most of the committee's report is occupied with discussing the cause of the fire, which they ascribe to a defective chimney. This, however, is not the point of general interest, which is the lesson that secondary precautions against fire are entitled to little confidence when there are radical vices of construction. It was, in fact, one of these secondary precautions that did the fatal mischief; for it was one of the iron tanks, breaking away from its supports under the roof, that killed the firemen, and, crushing through the stairs, carried the fire down into the basement. The committee lay a reasonable stress on the danger of building open elevators, which act as fire-flues from top to bottom.

In one of our earlier numbers appeared a communication suggesting the establishment of a new profession, that of "house-physician" or "sanitarian," whose function it should be to examine and prescribe for houses that were out of condition, especially in those matters that affect the health of their occupants, as physicians do for disordered men and women. Such a function has really taken shape among us during the last three or four years, and we find here and there in our large cities a person who has devoted himself to it. But in Edinboro' people have gone a step further, and are forming a co-operative association for this purpose. The need of frequent inspection and frequent alteration of the sanitary appliances of houses, as they are built at present, has attracted general attention; but the cost of consulting an engineer whose standing is such as to command confidence in his opinion is found to be so great that the plan has been set on foot, of organizing an association, with an annual subscription of one guinea, which shall secure to all its members a proper supervision of their houses without additional cost. The association is to maintain a corps of well-educated young engineers, under supervision of a consulting engineer of high standing; and it will be their duty to examine and report upon the dwellings of members once a year, and in special needs whenever they are called upon, giving advice and estimates for any alterations that they think necessary. They would be held to confine themselves to strictly necessary matters, and would be for obvious reasons forbidden to hold any pecuniary interest in patents or appliances which they might prescribe.

THE GEORGIAN HOUSES OF NEW ENGLAND.—II.

[See vol. II., p. 338.]

The chief beauties of the detail in colonial work arise from its disciplined and almost universal refinement and dignity, as well as the absence of vulgarity or eccentricity even when display is attempted. These virtues, not too common in our days, lend an added charm to it for us. The use of classical detail was universally agreed to, and the orders were naturally used by every carpenter; while so evident are the attractions of its detail, that the various societies of architects, giving voice to the general interest of the profession, are now proposing to sketch the old work with system. In view of this, one naturally inquires whence the information of the old builders came, and whether tradition and copying, as in mediæval times, could have led to such a varied use of Italian *motifs*. One asks whether there was not some more definite source of instruction for these carpenters in a new country; for to find this source might either enhance the value of the sketches, or else render them unnecessary.

The English mansions which Nash and Richardson have sketched for us so thoroughly were of an earlier period than the building days in our country. Longleat, Hatfield, Holland House, and many of those structures which like Longleat were built under Italian care, or, like the others, bore a more or less Italian detail on their mediæval forms,—date from about the time when the Pilgrims landed at Plymouth. Steep gables vie with pediments in these compositions, and mullions and pointed arches stand side by side with the orders. Of such work no examples of moment were raised on our shores, for it was doubtless long before buildings of any pretension were required by a struggling people. But this was not the case with movable objects, and this Jacobean period has been well handed down to us in the many pieces of furniture brought over or made by the early colonists. As is well known, the chairs reputed to have come over in the Mayflower might have taken a fleet, and the New England family that does not possess one or more has feeble claim to aristocratic pretension. The bulbous legs and posts, the ill-formed pediments, and the other details now so much studied, appeared however, in our country, in these forms alone.

But meanwhile Inigo Jones made his two visits to Italy, and, full of enthusiasm for Palladio's work, designed in a pure Italian manner, with well-understood detail. He even added an Italian portico to the noble mediæval cathedral of St. Paul. When he died in 1652, Sir Christopher Wren monopolized all the important English practice, working always with much regard for group and line, and mechanical skill, but with far less care for detail than his predecessor. He died in his turn in 1723. Vanbrugh, Hawksmoor, Gibbs, Campbell, Taylor, Adam, Chambers, such are the more or less familiar names whose work occupied the rest of the century; and the period when our colonial work was rich and interesting is thus included between the lives of Jones and Chambers. Their work is often reflected in it; often it may have been actually their work.

It is the period of rule and method; of aliquot parts, modules, and minutes. True, this discipline is confined to details; for, as in the case of the exteriors of the houses, the plans equally admitted very varied and picturesque effects. These principally regarded the stairs. At the Holmes and Longfellow houses in Cambridge, the front and rear stairs start from opposite ends of the house, and separate again after meeting on a common landing. At the Ladd and another house in Portsmouth, they in different manners wind up in the corner of the larger hall. At the Winslow house in Plymouth, the stair-landing crosses the door opening, and the portion left open above the landing is filled in with twisted balusters.

Yet, while picturesque effects add many charms to the old mansions, their distinguished and refined character still seems owing to careful rules and studied training in the orders and their details; and I find that old libraries furnish the clew to all this, much more than might be supposed. So very many and so carefully prepared are the English works alone on architecture, which appeared in the last century, that while the sketches proposed by the various societies will be most valuable as records of the groups and combinations of old work, as well as studies of interesting details, yet they will hardly cover simple *motifs* not already engraved in these books. I have found a large copy of Batty Langley's classical work in an old loft in New Hampshire;

and while I doubt not that such books were common in the days when our early work was executed, I even think that if studied, existing mantels, cornices, alcoves, etc., would probably be identified in these books.

Mr. Eastlake, in his History of the Gothic Revival, speaks of English works on classical design by Shute in 1563, and Sir Henry Wotton in 1624. These I have not seen; but one can readily see others in our libraries. Gibbs's works, published in 1739, included the engravings of St. Martin's Church in London. Batty and Thomas Langley, besides their Gothic book, which Mr. Eastlake ridicules, also published an excellent classical work, most of the plates in which are dated 1739. Ware's Architecture, which is voluminous, and has many plates of interiors, is dated 1750. Chippendale's book is dated 1762, and gives as furniture in the "most fashionable styles," which were evidently French; and it seems as if Gov. Langdon who built in 1784, or Jeremiah Lee whose house dates from 1768, had perhaps received a copy of this work before the Louis Quinze curves were cut on their great chimney-pieces at Portsmouth and Marblehead. This same Chippendale, whose chairs and tables, or their copies, are frequent in America, besides affecting a French taste, had a fancy for Chinese work, giving us designs for chairs and railings in the Chinese manner. Chairs of this make are to be seen at Portsmouth, and he seems an amusing forerunner to the Queen Anne Japanese designers of to-day. Swan's book follows these others in 1768, with many designs for mantels and other work, and Paine publishes fine plates in 1783; while the third edition of the correct and elegant Sir William Chambers is dated 1791. In 1811 Asher Benjamin published in Charlestown, Mass., the second edition of the "American Builder's Companion," which contains most of the types of cornices, mantels, and other details to be seen about the houses of that date east of the Connecticut river, — such as the Tiskmor House on Park Street, the old Franklin Street houses in Boston, and the West Boston church, — while almost the same date, on the other side of the water, Thomas Hope published a series of beautiful drawings of furniture, inspired by the discoveries at Spalatro and at Athens, and made familiar to us by the French furniture of the First Empire; and with him the Greek and Roman periods that we are intimate with are foreshadowed.

These books, which are probably but examples of a larger number, indicate how our forefathers obtained their knowledge. They are filled with designs of doors and windows, chimney-pieces, buffets, monuments, clock-cases, *busts*, girandoles, tables, and chairs. Often the plates are very fine, but they rarely suggest the extreme delicacy and fineness of moulding so characteristic of the real work. Curiously enough however, while ramped rails and turned or carved balusters occur in these books, not one print have I seen of a twisted baluster such as were well-nigh universal in all houses of importance with us at that time. This is not because they were peculiar to this country; indeed, I have supposed ours were largely carved in England, and at any rate I well remember almost identical patterns in London. Why they do not appear in the plates I do not understand, in view of their being the most conspicuous ornament in American work of that time.

Almost all the designing found in these volumes is founded on a study of the orders, which is throughout held as almost synonymous with the study of architecture. Mr. B. Langley thus urges this fact on his hearers: "'Tis a Matter of very great Surprise to me, how any person dare presume to discourage others from the Study thereof, and thereby render them very often less serviceable to the Publick than so many Brutes. But to prevent this Infection from diffusing its poisonous Effluvia's any further," he, in short, peremptorily admonishes his readers to understand the five orders of columns, whose general proportions will not escape their memories "after having practised them about half a Dozen Times."

R. S. PEABODY.

APPLICATIONS OF THE EQUILIBRIUM POLYGON TO DETERMINE THE RE-ACTIONS AT THE SUPPORTS OF ROOF-TRUSSES. — III.

BY JAMES R. WILLETT, A. I. A.

[A paper read before the Civil Engineers' Club of the North-West, Chicago, Sept. 4, 1877.]

FIGURE 8

Illustrates the case of a truss with an arched lower chord or tie-beam. It also shows the effect of adding or subtracting any given amount of horizontal force to each of the supports, such amounts acting in contrary directions.

Diagram (II) is the equilibrium polygon for the set of forces acting on the rafters, and (III) for the set acting on lower chord: they are found as before described. Diagram (IV) is the polygon of forces for the lower set; and the double lines in diagram (V) is that for the upper set. The point Z on the closing line LL^2 (V) is found as before; on this point superimpose the point Z^2 (IV), so that the dotted line OR (V) represents and stands for the line MM^2 (IV). The whole polygon of forces (IV) might now be drawn on OR; but we will omit this, and proceed to show the effect of altering the horizontal components of the re-actions.

Suppose, now, that a horizontal line be drawn through one end of the dotted line OR, and another through the other end. These lines are Mm and M^2m^2. Now, assume any point in either of these lines, and through it draw a line parallel to OR [or, what is the same thing, MM^2 (IV)]; then the portion of this line lying

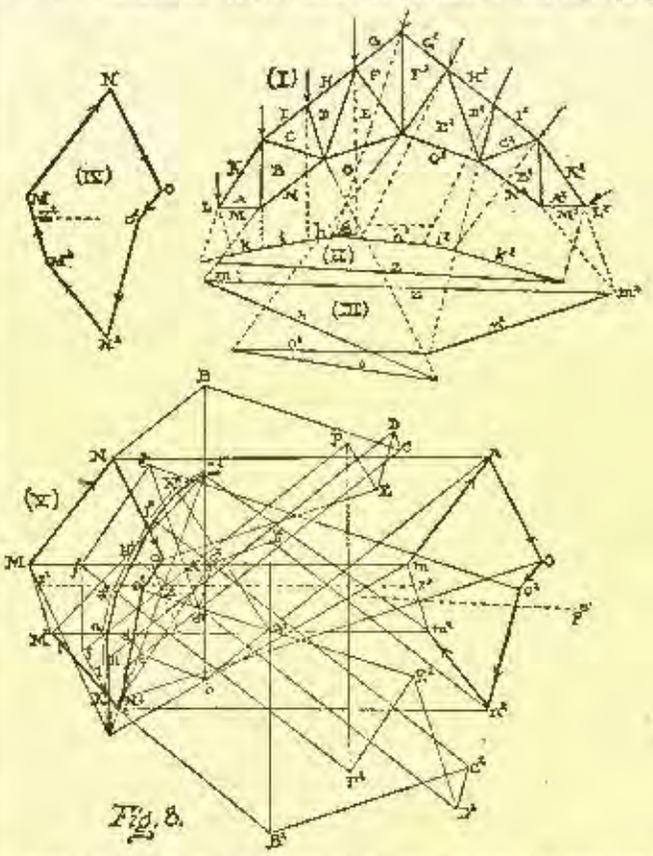


Fig. 8.

between the horizontal lines Mm, M^2m^2, may be taken to represent the closing line MM^2 (IV), and the polygon as shown in (IV) completed.

This is done in (V) in two places; the closing line in one place being represented by MM^2, and in the other by mm^2, and the polygon of forces shown in (IV) completed. Either of these polygons may be taken, and combined with the polygon of forces for the upper set, and the strains on the various members of the truss drawn out in the usual way; the re-actions in the one case being LM and L^2M^2, and in the other Lm and L^2m^2; the letters used in one case being A, B, C, etc., and in the other a, b, c, etc.

It will be seen that the strains on the members of the truss are different for each position of the polygon corresponding to (IV). Had the lower chord or tie-beam been straight, the strains in all of the members, except the tie-beam, would have been identical, as remarked under the heading of Fig. 4. Indeed, it may be noted that portions of the tie-beam AM and A^2M^2 are horizontal, and that, in the strain diagram, the points A and A^2 are identical for both positions of the forces corresponding to (IV).

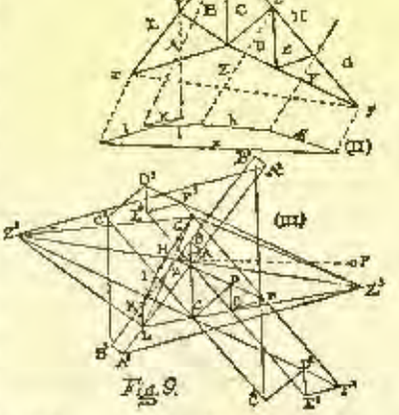


Fig. 9.

FIGURE 9.

We have previously shown how the horizontal components of the re-actions could be altered, provided that the same amount that was added or subtracted from the re-action at one support was also added or subtracted, in a contrary direction, to the re-action at the other support.

We will now show that this is but a particular statement of a general principle, which is, that, instead of the direction of these additional amounts being necessarily horizontal, they are parallel to the line joining the points of support.

In Fig. 9, for simplicity's sake, the load is taken only on the rafters: (II) is the equilibrium polygon from which the point Z on the closing line LC (II) is found. The strains in the members of the truss are found as shown by LA, AB, BC, KB, etc. Sup-

pose, however, a line Z^2Z^3 be drawn through Z, parallel to xy (I), then any point on this line Z^2Z^3 may be taken to represent Z, and the polygon of strains for that point will close. In the diagram there are three sets of strains shown, — one for the point Z, to which the letters A, B, C, etc., belong; another for Z^2, to which the letters A^2, B^2, C^2, etc., belong; and a third point Z^3, to which the letters A^3, B^3, C^3, etc., belong.

FIGURE 10.

It has been remarked, under the heading of Fig. 6, that, when a truss is loaded on both rafters and tie-beam, the re-actions at the supports which are obtained are not necessarily parallel. If it is

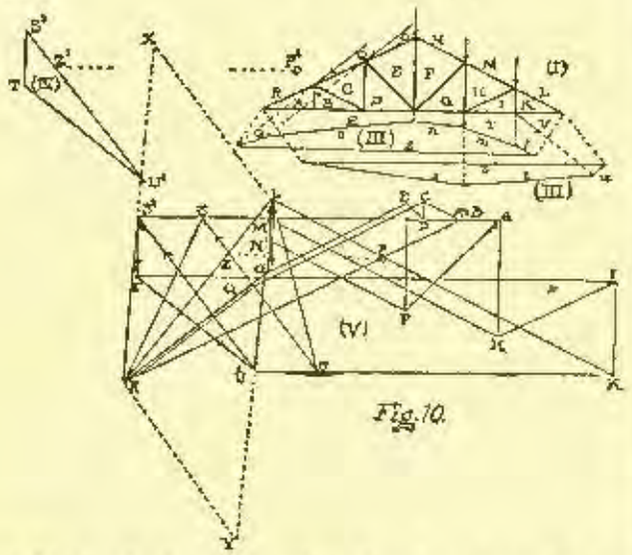


Fig. 10.

desirable to make them so, — and it often, if not generally, is, — this figure describes the method of doing so.

Diagram (II) is the equilibrium polygon for the forces on the rafters; (III) the equilibrium polygon for the forces on the tie-beam; (IV) the polygon of forces along the tie-beam; and the double line in (V) the polygon of forces along the rafters.

The points Z in (V), and Z^2 in (IV), are found as usual. Suppose the closing line S^3U^3 in (IV) is placed so that the point Z^3 is superimposed on Z in (V), then the line SU corresponds and answers for S^3U^3; the re-actions being RS and UL, which are evidently not parallel to each other. Now, if lines S^2G and U^2K be drawn through the points S and U, parallel to the line joining the supports of the truss, which in this case coincides with the tie-beam, then if any point be assumed on either of these two parallel lines, and from it a line parallel to SU be drawn until it meets

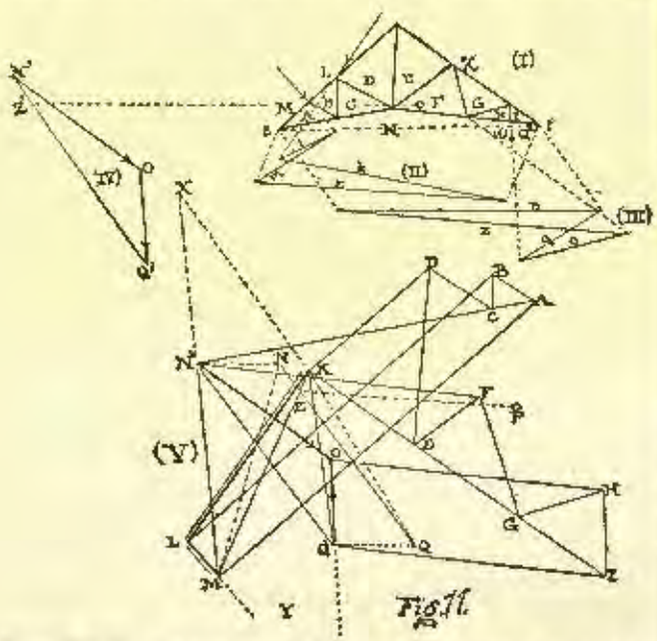


Fig. 11.

the other line, this line may be taken as the closing line of the forces shown in (IV), those forces laid off from it, and the strain diagram completed. The problem now is to find such a point as will cause the re-actions at the supports to be parallel. To find this, lay off the line LX equal and parallel to SU; then draw the line RX; from the point S^2, where this line crosses S^2G, draw S^2U^2 parallel to SU, until it meets U^2K in U^2; then S^2U^2 will be the closing line sought for, and the re-actions RS^2 and U^2L will be parallel.

If the line RY be laid off equal and parallel to SU, and a line drawn from Y to L, then the line YL will be found to cross the line U^2K at the point U^2, thus checking the work.

The complete polygon of forces corresponding to (IV) can now be drawn on S^2U^2, and the strain diagram completed.

FIGURE 11

Is similar to Fig. 10, except that the tie-beam does not coincide with the line *st* joining the points of support. This does not affect the construction, though the lines N^2N and QQ^2, both drawn parallel to st, do not coincide with the lines of the strain diagram, as in the former case.

THE ILLUSTRATIONS.

ST. JOHN'S CHURCH, DUBUQUE, IO. MR. HENRY M. CONGDON, ARCHITECT.

This building is now approaching completion. It is built of native rock, of a light cream-color, relieved by finish of a harder stone not far different in color. The ground floor seats about 600. The site sloping towards the river gives a large Sunday-school room in the basement.

RESIDENCE OF W. F. TUCKER, ESQ., CHICAGO, ILL. MR. J. M. VAN OSDEL, ARCHITECT.

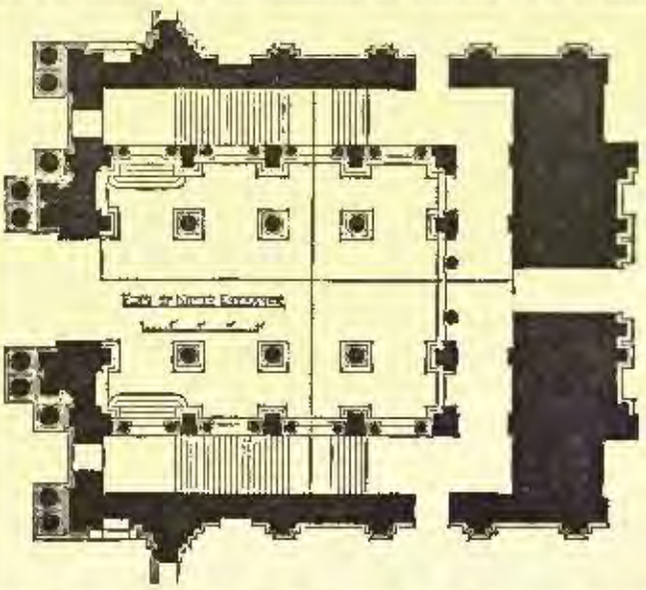
This house, which cost about $15,000, is faced on all sides with Philadelphia brick. The belts, lintels, skewbacks, etc., are of Lemont sandstone. The interior is finished in hard wood.

RESIDENCE OF EDWARD ENGLE, ESQ., CHICAGO, ILL. MESSRS. BURNHAM AND ROOT, ARCHITECTS.

This house, which cost about $15,000, is of Lemont limestone relieved with bands, *voussoirs*, etc., of Columbia stone.

DETAIL OF THE NORTHERN ENTRANCE OF THE NEW CITY HALL, PHILADELPHIA, PENN. MR. J. M'ARTHUR, JUN., ARCHITECT.

The elevation is made on the line of longitudinal, section, through the northern entrance, and shows the screen behind which are the staircases to the Chambers of Councils. The columns

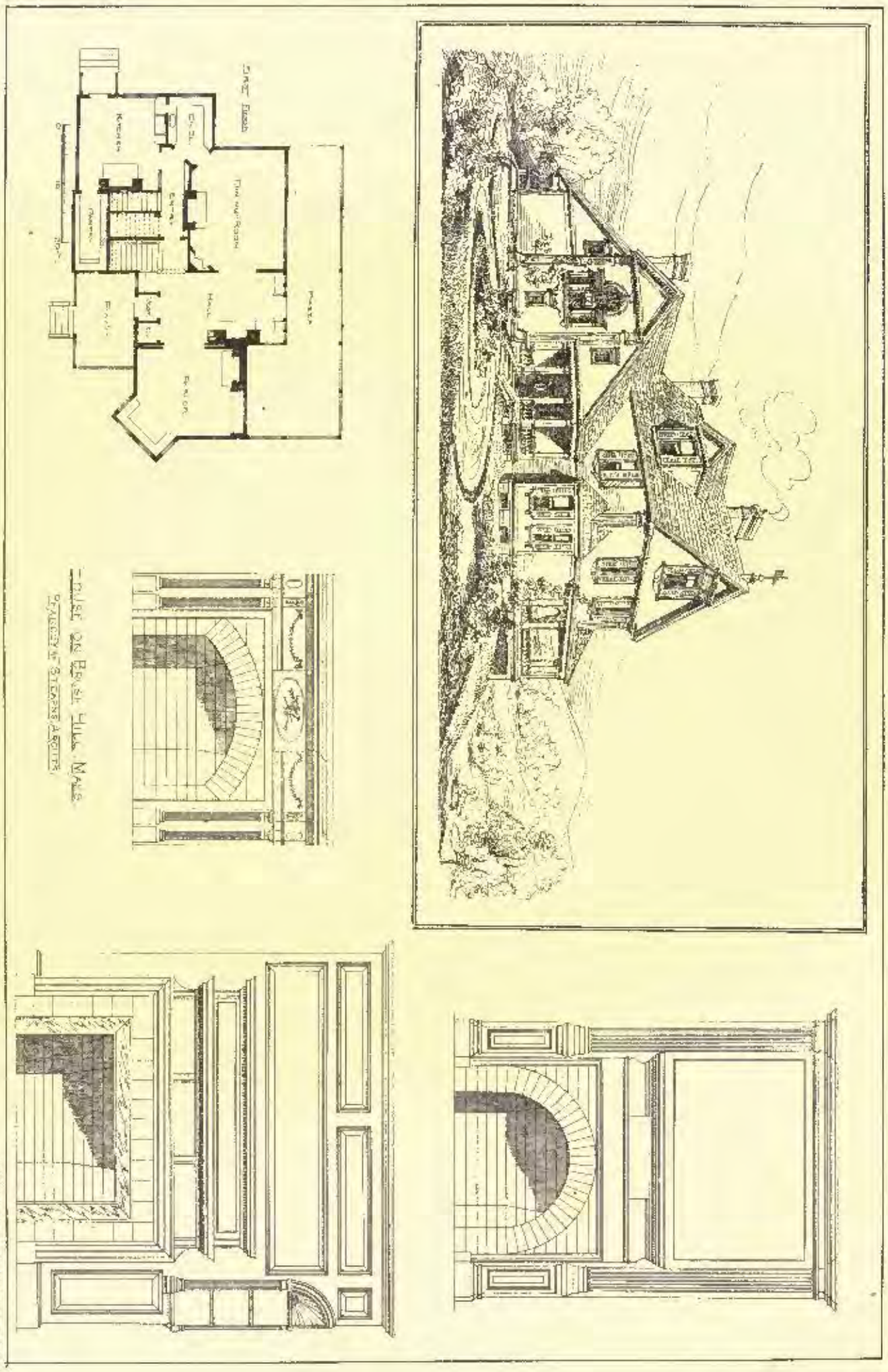


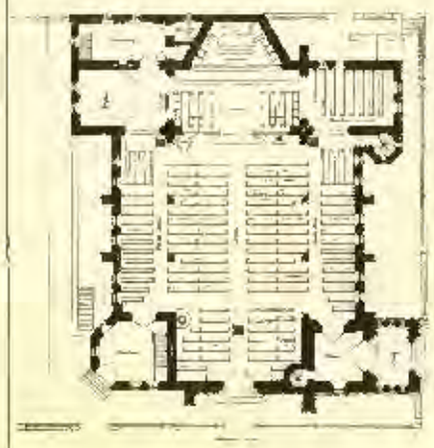
and pilasters, with their pedestals, are of red and blue granite polished; and the walls of the screen, together with all the entablatures, are of Ohio sandstone.

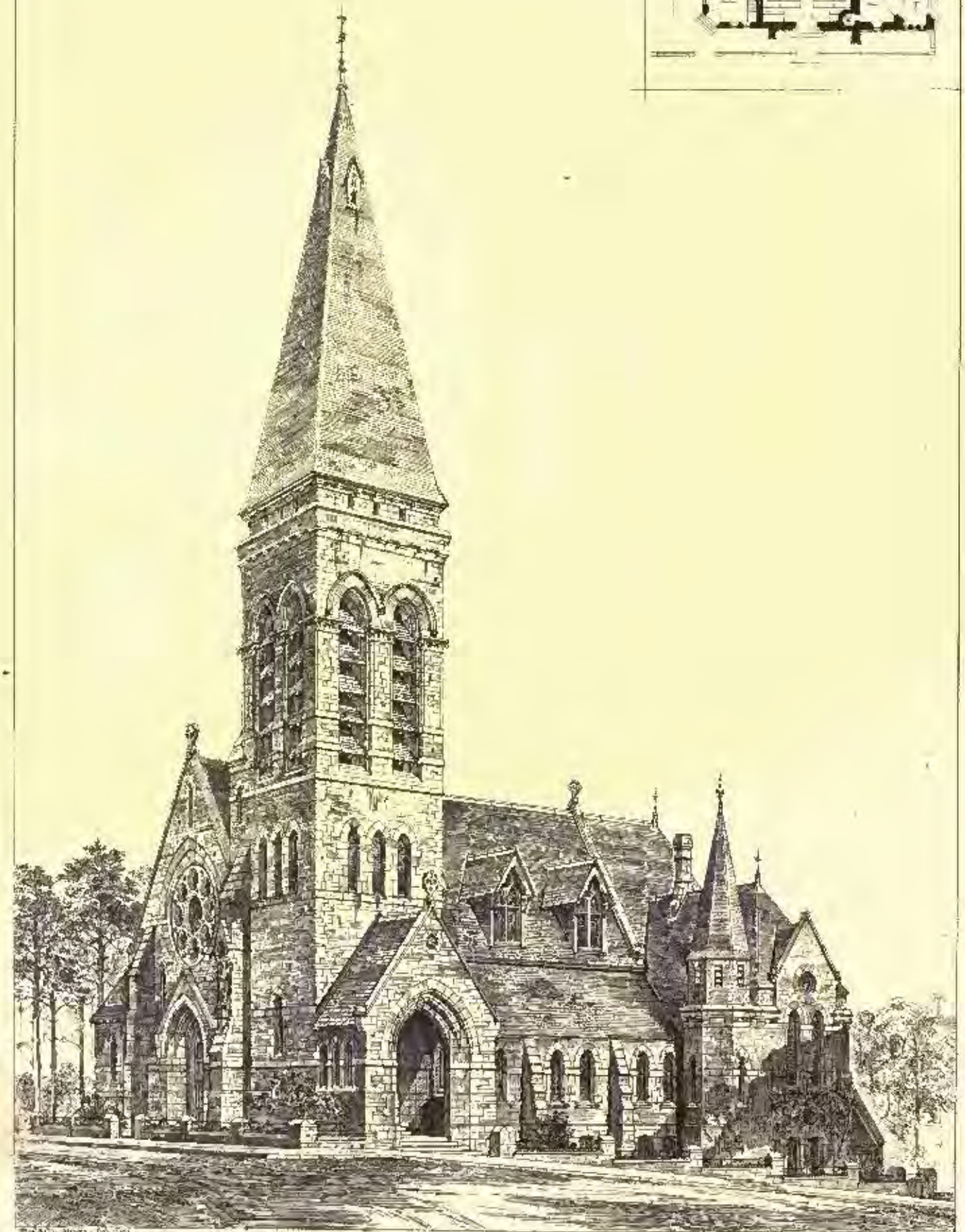
HOUSE AT BRUSH HILL, NEAR BOSTON. MESSRS. PEABODY AND STEARNS, ARCHITECTS.

The hall of this house is lined to the ceiling with a wainscot of painted pine, with raised panels. The cupboards, mantels, and staircases are also designed after the style of colonial work.

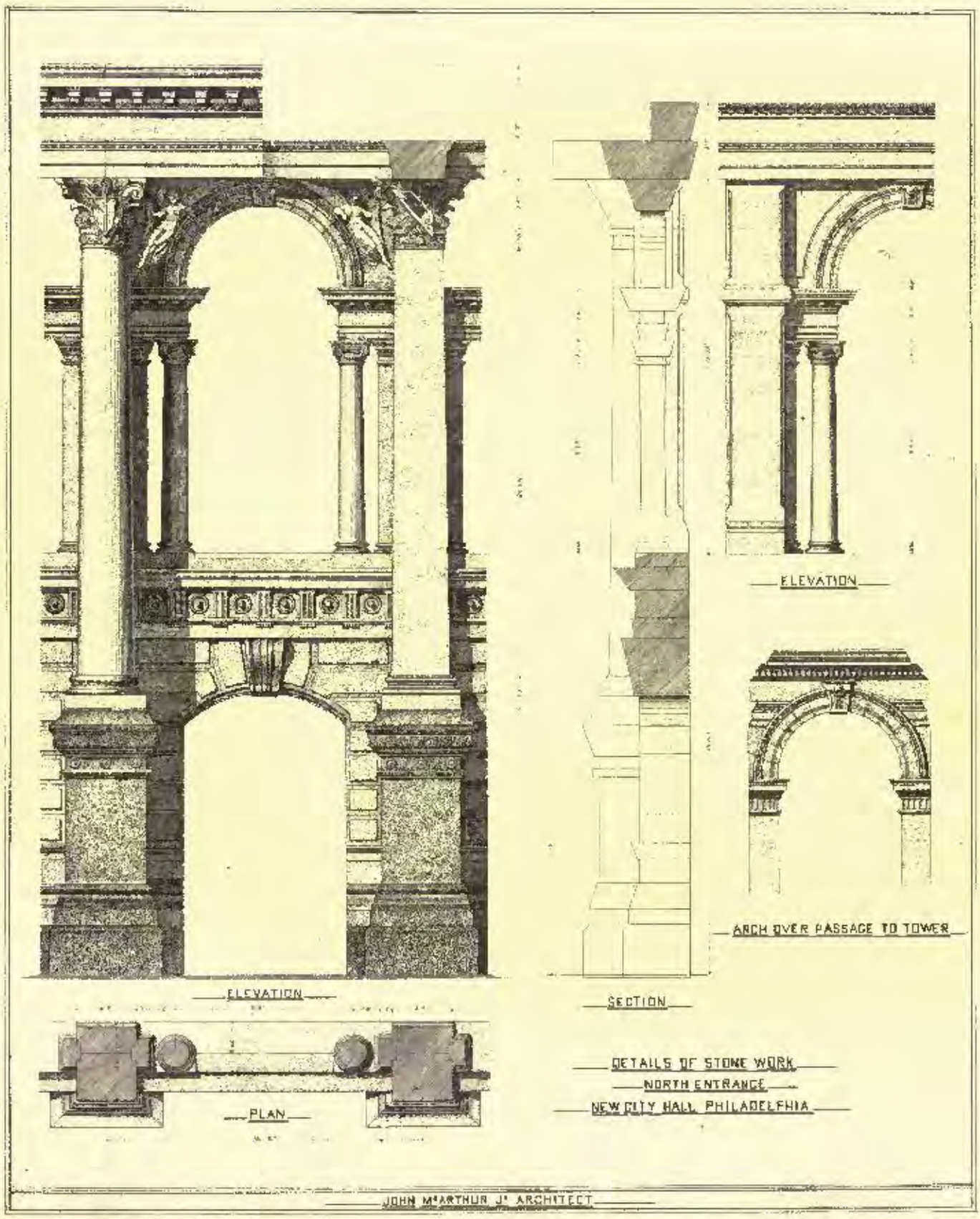
ROOFERS' TRICKS. — Keeper Dugan, of the Jefferson Market Prison, New York, found the rooms on the two upper tiers flooded with water, Feb. 9. It was then discovered that throughout the entire surface of the roof the slates had not been properly lapped, and that consequently the snow had entered the loft, accumulating in large quantities. Complaints of the condition of the prison had been made to the Commissioner of Public Works from time to time, but had received no attention.


DINING ROOM
HALL
PARLOR
HOUSE ON BRUSH HILL MALE
PHILADELPHIA STEAMS ARCHITS

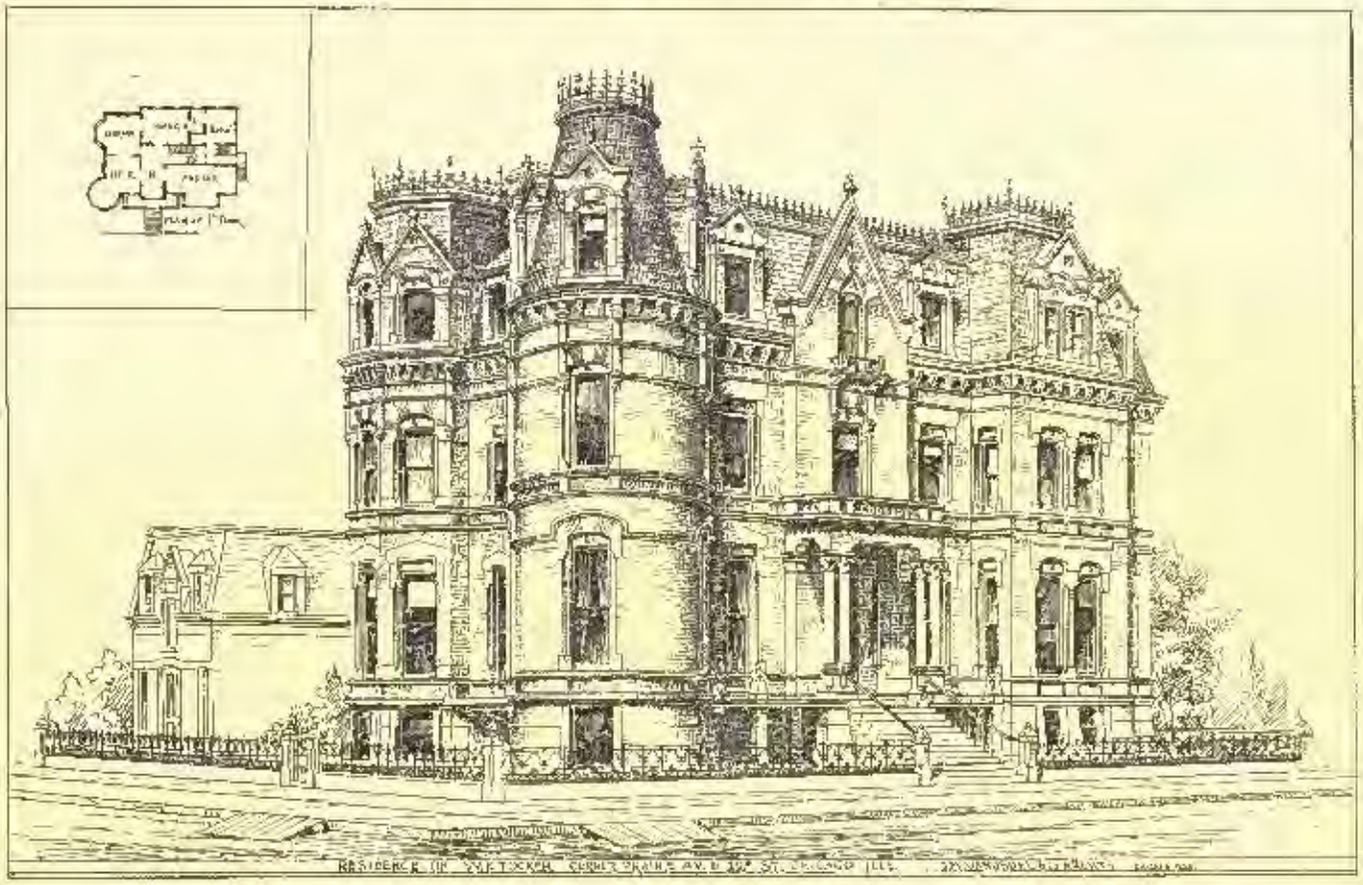


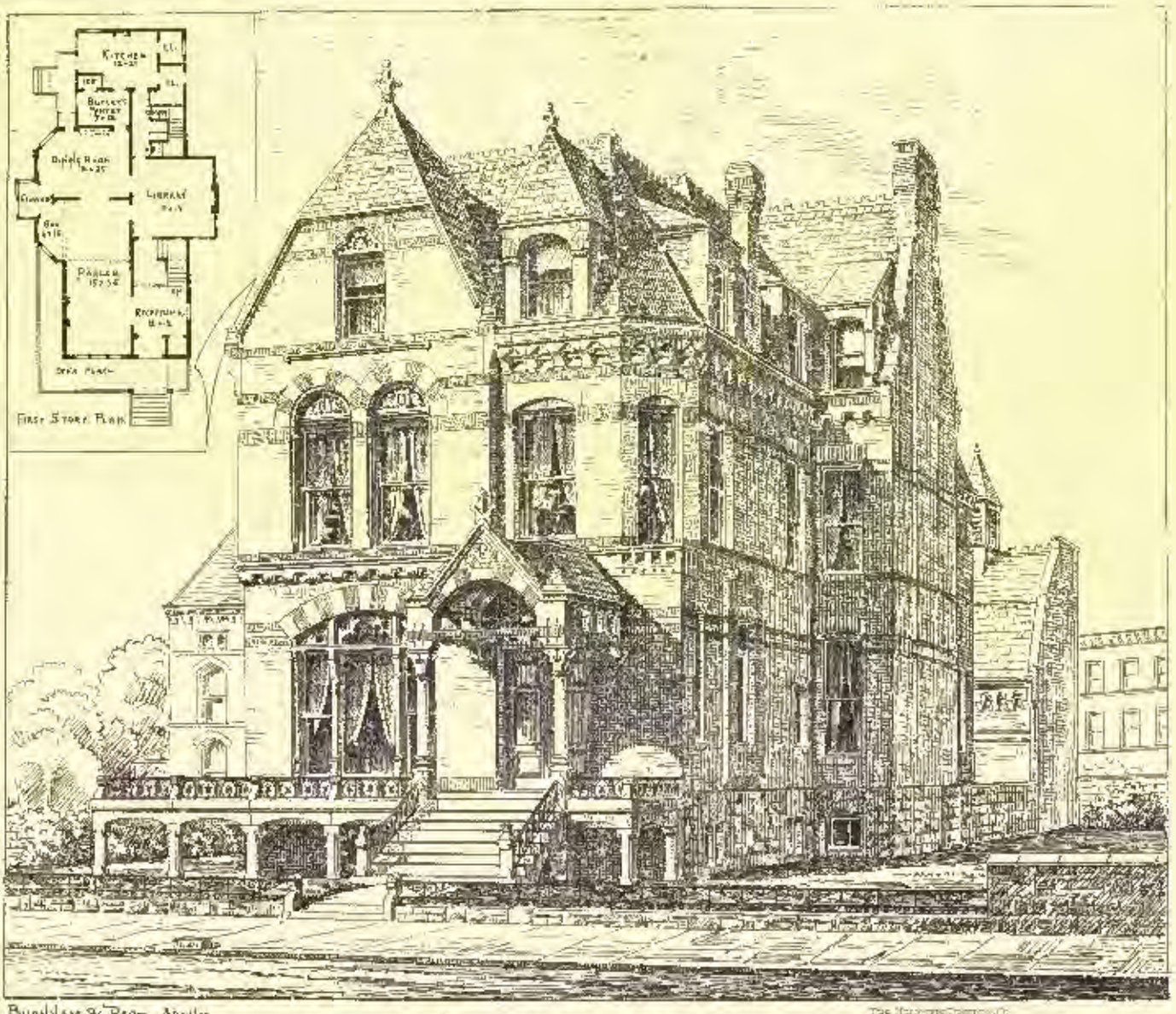


— ST JOHN'S CHURCH. DUBUQUE. IA. —



THE HELIOTYPE PRINTING CO. AND DESIGNERS ON BOSTON





BURNHAM & ROOT ARCHTS

RESIDENCE OF EDWARD ENGLE ESQ

BOOK NOTICE.[1]

THIS is a book, of a kind of which there are many, that aims to strike midway between a complete treatise and a manual of rules and formulæ, — a thing which we need not say it is very difficult to do successfully. It takes up the whole subject of heating and ventilating buildings, — with what succinctness, necessary in a 12mo volume of eighty odd pages, the reader may judge. There is a chapter on general principles of ventilation by exhaust and supply, radiation direct and indirect, and currents of air; one on the vitiation of air and the supply of fresh air, its flow in ducts and the means of moving it; on the production and transmission of heat; on heating by water and steam, with size of pipes, circulation, grates and boilers; on the humidity of air, and tension of vapor. The book gives a number of tables and a great many formulæ for practical use; but chiefly of a technical kind, taken apparently from various sources, and more or less from Peclet, correctly given, as far as we have had time to examine them, except for some typographical errors which seem to show want of care in proof-reading. These are strung together by discussions which are necessarily very brief and comprehensive, — too much so to be always clear, — and which are liable to the objection that always waits on such efforts, that they are unnecessary to those who understand the subject, and to those who do not, they give rise to more questions than they answer. The examples given and solved are of practical application, and with the formulæ ought to be of service to those who have similar problems to deal with, and are not afraid of the necessary figures.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

THERE having been no quorum at the regular monthly meeting on the 1st of February, by reason of the severe storm, a special meeting was held at the Institute of Technology, on the evening of Friday, Feb. 8; Mr. John H. Sturgis, Vice-President, in the chair.

After a discussion raised by the Committee on Elections regarding the powers of that committee, Mr. Van Brunt proceeded to read a paper on "The Growth of the Conscientious Spirit in the Arts of Decoration."

The object of this paper was to prove that the accumulation, classification, and analysis of precedents in art, for which the last twenty-five years had been especially remarkable, had imposed upon the artist certain duties and responsibilities hitherto unknown; that a self-conscious element had been introduced into modern design by the necessity of making choice among various styles; that this necessity implied, on the part of the artist, self-justification, self-denial, analysis, and, in general, conscientiousness. The function of the older architects was confined to the consistent development of a certain set of forms. Their business was to assist in the growth of a style; in this work their individuality was lost. The old architecture was rather a growth than a creation: the new architecture must be rather a creation than a growth. Hence modern monuments are permeated with an intense personality. The responsibilities of the modern architect are not satisfied by skill, ingenuity, invention, and the other qualities which sufficed for our ancestors: he needs also the learning and spirit of research implied by knowledge of precedent; he needs also the spirit of analysis and discussion necessary to enable him to make proper and judicious use of such precedent.

These statements were illustrated by contrasting with our own methods of design those of the Greeks and Romans, the mediæval artists and the Japanese, and by drawing attention to the fact that from the nature of the case, but few names of architects are preserved to us from ancient times, and these names are shadowy and uncertain.

He concluded by saying that our present conditions of life must give to art in all its forms certain distinctive characteristics. These conditions involve the establishment of principles, and not forms, as standards of excellent work; they make forms the language, and not the end, of design; and they inculcate the enlargement and enrichment of this language by the study of nature and of all antecedent arts, to the end that we may express our thoughts in art as we would in literature, with an elegance, precision, and completeness, commensurate with our larger opportunities and our greater resources. Modern architecture has hitherto concerned itself mainly with the parts of speech, and given us exercises in grammar; now we are prepared to give to art its true function, — to instruct as well as to delight, to appeal to the intellect and heart as well as to the taste, to have larger scope and fuller meaning in all its expressions.

Mr. Ware then made a few remarks substantially in agreement with the views expressed in the paper. He said that the conditions of success are undoubtedly different now from those heretofore existing. This difference consists mainly in the fact that the greater freedom must beget the greater responsibility; hence follows that moral element in design, which, as the paper stated, must needs confer upon modern work its essential characteristics.

Mr. Cummings expressed some doubts whether the conditions of art are so different now from those of earlier times. He instanced especially the architects of the Florentine palaces, in the time of the greatest activity of Italian art, who, notwithstanding the knowledge of conflicting precedent which they must have possessed, pursued their chosen style, without being diverted by their knowledge. This would seem to imply the possession of moral convictions.

Mr. Ware replied that in this respect they did not differ from the architects of a later time, — even so late as the first half of the present century. The Florentine builders could not have been blinder to the mediæval work around them than the moderns have been, until lately, as regards certain phases of precedent art; they could not have despised their Gothic precedents more than the disciples of Ruskin have despised Jones, Gibbs, Hawksmoor, Chambers, and the other architects of the English Renaissance. But the point of contrast between the conditions of art now and formerly is that a more scientific and exact knowledge of the development and significance of all the styles and of their relations with humanity, the more complete and thorough analysis and classification of them, have disarmed our prejudices, and placed us in a judicial attitude regarding them, calling for a more moral and intellectual treatment of design, establishing principles instead of forms.

Mr. Sturgis, the Vice-President, agreed with Mr. Ware that the greater openness of mind in modern times was making us much more catholic in regard to style, and that the new external conditions of life, combined with our insatiable curiosity and thirst for knowledge, were creating among architects a very marked intellectual peculiarity in their work.

Mr. Earle drew attention to the phenomenon regarding style now witnessed in England, where forms of the Early English Renaissance, which until lately were denounced as barbarous, are now rehabilitated in new work. He asked if this does not indicate a want of the conscientious spirit.

Mr. Ware considered that the revival of the Queen Anne and Jacobean styles, so called, is a natural recoil or revolt of the artistic mind from the undue control exercised over it by Pugin and Ruskin and their followers in the interest of the mediæval revival. It seems to be a matter of feeling and impulse justified by the occasion, indicative of a greater catholicity of spirit, and not inconsistent with the moral instincts of the new culture.

After some further conversation, in which Mr. Martin, Mr. Thayer, and Mr. Van Brunt took part, the vote of thanks to Mr. Van Brunt, proposed by Mr. Earle, was passed.

Mr. Ware then called the attention of the meeting to a proposition of Mr. J. T. Clarke, a junior member of the Boston Chapter, to go abroad to prosecute some original researches in the antiquities of Greece, and with a view to enlisting the sympathies of the Chapter, he called upon Mr. Clarke for a detailed statement of his scheme.

Mr. Clarke gave a general statement of the proposed field of his researches in Attica, Delos, Mitylene, Olympia, Phygalia, and Patras, where there are remains still unexplored; he also proposed to visit Corfu, which promised to yield a rich return to careful study.

After some further discussion of the subject, on motion of Mr. Ware it was voted to refer this question to the committee appointed at the last meeting to consider the disposal of certain funds in the hands of the Treasurer, with instructions to report at the next meeting. The meeting then adjourned.

AMERICAN ARCHITECTURE FROM A FRENCH STANDPOINT. — II.

[See vol. II., p. 408.]

Nos. 378, 581, *et seq.* We meet here with a name known in Paris, — Mr. Hunt, who, it is said, studied under M. Lefuel. He displays some schemes for the embellishment of Central Park in New York. These different designs, illustrated here by sepia-drawings, were not carried out. They include complete perspective views and some separate designs, a pedestal, and an equestrian statue. Unfortunately, we look in vain for any general plan, so that it is rather difficult to tell at first sight where such and such drawings belong. We much prefer the same artist's design for the Lenox Library (594 and 596). This is a "project," as we understand it in Europe, with plans, sections, elevations, and a perspective view. Two large rectangular halls are connected by a wide vestibule; in front is a court; and at the rear are apartments between the two staircases, which lead to the upper stories. Such is the plan very simply and pleasingly arranged. The halls contain high galleries, which are reached by winding staircases, concealed within projections, which likewise enclose the hot-air and ventilating flues. The principal elevation shows the court with the two projecting wings. The bays of the first story are built up to half their height; above is a high story embodying the principal

[1] A Manual of Heating and Ventilation, in their Practical Application, for the Use of Engineers and Architects; embracing a Series of Tables and Formulæ for Convenience of Reading, Flow and Return Pipes, for Steam and Water Boilers, Flues, etc. By F. Schumann, C.E., United States Treasury Department, Corresponding Member of the American Institute of Architects, Author of "Formulæ and Tables for Architects and Engineers." New York: D. Van Nostrand, publisher, 23 Murray and 27 Warren Streets. 1877.

feature,—three wide arches supported by columns; and above this, forming an attic, is a third story. Each wing is crowned by a pediment with a bust. The design is simple and striking.

Mr. Hunt also exhibits the photograph of a cast-iron store-front. It is Moorish in style, and not unpleasing in aspect. I mention once more, by the same artist, a drawing for the New York *Tribune* building. This is one of those whimsical constructions now the mode in New York, and which, it is to be feared, will have but too much success in the United States. What I am about to say may seem like a jest; but builders here vie in overtopping each other. When I shall have told you that the compound of brick and stone in question includes nine stories, that it is flanked by a tower which has thirteen, and that above this is a very high steep roof, you will admit the justice of my statement.[1] The monument is not pleasing: red bricks intersected by lines of black form a kind of textile design, which is pierced by a multitude of windows. Mr. Hunt was a member of the American jury in the architectural section, and was consequently out of competition.

Mr. Fernbach (630 *et seq.*) seems to me one of the architects of most mark represented at the exhibition. His drawings are very well and carefully made; and his buildings seem to be perfectly adapted to their purposes, which is a very rare thing here. Next to a synagogue built on Lexington Avenue, New York, the motive of whose façade is very simple, he displays a building for an insurance company at Philadelphia. This is certainly one of the most happily conceived buildings in the city. An effective and well-studied view of a balcony and a perspective view of the staircase accompany a perspective drawing of the façade. Mr. Fernbach also shows two other structures built at New York: a drawing for a German bank, good in style, but not equal to the Philadelphia building, and a photograph of a German newspaper office [the *Staats-Zeitung*]. The general aspect of these buildings is severe. Mr. Fernbach received a medal.

Mr. Post (603 *et seq.*) also fills a large space in the catalogue; and his display, without offering the studious qualities of the preceding, is not wanting in interest. His chief production is the building for the Western Union Telegraph Company at New York. This brick colossus, completed scarcely two and a half years ago, is one of the most important monuments of the city. The lower division includes the ground floor and the story above. The principal door, flanked by two marble columns on each side, is crowned by a balcony, at the corners of which stand two bronze statues. The main body includes at first but four stories, above which is an enormous cornice with a balcony. At this height we are but half way up the building. From the balcony another structure rises. A high story serves as a base for immense roofs containing three additional stories. Finally, crowning the whole, comes a tower with a clock, and above this an octagonal roof surmounted by a platform, and carrying a flagstaff. The general effect is heavy, and far from elegant; but we feel that this colossus might well shelter a whole world. It is, in fact, one of those industrial barracks which replace in this country, perhaps advantageously in the general embellishment of a city, the military barracks of our own country. Mr. Post exhibits in addition the *Evening Post* building, which is also of the barrack species; and a perspective view of a hospital.

Under Nos. 553 to 561 is a series of photographs of churches of only secondary interest. The author, Mr. Richard M. Upjohn of New York, who received a medal, also exhibits under No. 506, a drawing for the State House at Hartford. We find in this last building a strange medley of styles and of schools. Turrets resting on very short columns, which are themselves placed over classic Corinthian columns, a dome with a Gothic lantern, and the like, give to the building an air which recalls the drawings of Gustave Doré. Steep roofs and peaked dormers produce a chaos. Mr. Upjohn has a large practice; and in my opinion, the sanction of his example may, I venture to say, have a mischievous influence upon young New York architects.

From 623 to 629 are to be found, perhaps, the most curious drawings of the exhibition, and which may serve as specimens [Why?—*Eds. Am. Architect*] of American architecture. Notwithstanding the good intentions of the critic, it is impossible not to declare these drawings bad as regards both rendering and composition. They yet give, I regret to say, the true note of the present architecture of the country. The construction is of wood and zinc; and in the whole composition there is neither method, plan, nor consistency. The windows are placed hap-hazard; the roofs are tumbled together fantastically; here a turret, there a projecting gallery; here a part recessed, there another brought forward; all this in the most purposeless fashion. It is the most complete disorder. The chief of these drawings is a design for a hotel at Santa Barbara, Cal. Imagine an immense barrack of five stories. Upon the sidewalk in front stand wooden posts reaching to the third story, and carrying a wooden roof forming a veranda, which puts the whole third story in shadow. At the four angles are four pavilions of two additional stories, making seven, with roofs of two stories more, making nine. Cover the whole with steep roofs, sprinkle here and there flagstaffs with waving pennons, and you will have an idea of the general effect. If I dwell at length on this design, it is because it seems to have met with some approval.

Under Nos. 636 to 642 come a series of churches, the most successful of which are Mr. Potter's. The arrangements are greatly at fault. No. 638 is especially distinguished for a craving after complications, fantastic clusters of roofs and the like.

The library of Messrs. Potter and Robertson is more simple. If we except the singular arrangement of the roofs, the effect is agreeable. One feels in Mr. Potter's designs an attempt to deviate from the customary paths, and an effort after originality.

Mr. LeBrun exhibits (678) the New York Masonic Temple. This building which cost, it is said, five million dollars, is yet very simply arranged, and is not without a certain grandeur of style. The proportions are judiciously studied; no excessively steep roofs, no pretentious endeavors, no whimseys; the whole is praiseworthy, and indicates a serious and practical spirit. The building, to tell the truth, has rather the air of a palace than of a temple. For that matter, the American Free Masons form a rich and powerful body, and can afford palaces. The Masonic Hall in Philadelphia, for example, which is of granite, cost four million dollars.

Messrs. Cambrill and Richardson are artists who in their remarkable pen-and-ink drawings (681 *et seq.*) seek rather a picturesque rendering than serious architectural qualities. Nevertheless their display is well worth attention. There is great originality in the churches and court-houses which they show us. Notwithstanding many turrets and steep roofs, it is felt that their designs are thoroughly studied.

Mr. Pohl (Nos. 704 *et seq.*) exhibits a scheme for the Universal Exhibition. The building, which consists of seven parallel galleries lighted from the top, is wanting in simplicity of detail. In appearance it is heavy, and would have missed to a very great degree the lightness and elegance of the main building as actually built. Mr. Pohl is a German, and studied at Berlin.

Mr. Fairfax (711 *et seq.*) exhibits a scheme which secured him a reward on the occasion of the competition for the exhibition buildings. His design is remarkable; and that it was not accepted is probably because the committee shrank from too great an expense. The drawings are on too small a scale to enable one to properly judge of the details.

Nos. 721 to 751. Messrs. Schwarzmann and Kafka display side by side a collection of drawings, among which are the Memorial Hall and Horticultural Hall of the Philadelphia Exhibition. Mr. Kafka, a pupil of the Munich school, and who shares its merits and failings, had already appeared at Vienna in 1873. He exhibits here a design for a *casino*, which was awarded a prize there. Some villas in the German style and interior decorations for houses complete this display, which is one of the best. Messrs. Schwarzmann and Kafka built most of the principal buildings upon the grounds of the Philadelphia Exhibition. These structures are in general rather simply arranged; but they would have contributed something of monotony to the general effect, had there not been a certain number of other buildings to vigorously interpose, and break this uniformity of ornamentation. These gentlemen received a medal.

I will finish by mentioning the exhibition by the United States Government in its special building, of drawings of the different public buildings of Washington. In general, these monuments are known, except, indeed, the new building for the War Department, an immense palace placed next the White House in an admirable situation. It is embellished with colonnades; and, seen from the Potomac, ought to offer a rather imposing appearance. It is nevertheless open to the reproach of a lack of originality in detail; the different stories are too much alike. As to the interior disposition, which is said to be very good, the absence of a plan naturally prevented me from judging.—M. C. Pierou, in the *Revue Générale de l'Architecture*.

[1] It is well to recall here that ground for building-purposes in New York costs vastly more than in Paris or London; that is to say, probably more than in any city of the world. To the many stories which our correspondent mentions, might be added the stories of cellars. We know at New York a restaurant in the second story of a cellar going down, the kitchen, etc., being below in the third.—*Ed. Revue Générale de l'architecture.*

CORRESPONDENCE.

MORE ABOUT THE DOME.—THE NEW SINGER BUILDING.—DRY-ROT.

Chicago.

Since my last was written some remarkable developments have come to light, relating to the way in which our Court House *half* dome has been contracted for. On the 30th of July last the Board of County Commissioners ordered the architect to contract with P. J. Sexton to build "so much of the dome foundation as was necessary to enclose the building." It will be remembered that the building was well under way and the basement nearly completed at that time. But there was a gap where it had been contemplated to erect the dome, and nothing could be seen but the heads of piles which had been driven during the previous winter. The architect executed the contract by simply writing a letter to the contractor, directing him to go on with the work. The letter, which has now been published, fixed the rates at which the various kinds of work were to be paid for; and among them agreed

to pay eighty cents per cubic foot for dimension stone masonry. The following sentence was also inserted: "All openings to be measured solid." The letter was indorsed by all the members of the late building committee.

When the foundation proper had been completed, it appears that the architect ordered the contractor to stop work, and so informed the board. It now comes out that the order was stolen or suppressed. The architect refused to certify any more bills; but the board ordered the contractor to go on. He did so; and the architect continued to send in certificates, and the board to pay them, until now nearly $50,000 has been paid. In fact, the work was only recently stopped, as I have said before. The architect now certifies that $25,000 more is due; and the building committee have recommended that it be paid. But the board has recommitted the report; and the committee have just concluded that the money is not due. Hence warfare between all the interested parties.

It is now a question for legal heads to determine, as to what amount of work was contemplated in the original order or contract. It will be important to know if a building can be enclosed by completing the foundations for only a part of it. If a gap in one wall only is meant to be "enclosed," is it essential that the enclosing process should go on as long as the wall does, or up to the top of the building? and if a wall is thus to be enclosed, or a whole building, can it be done by constructing "foundations"? Here is a field for architecturo-legal inquiry never before equalled. The question also comes up as to whether the contractor received his instructions from the committee or the board. If from the former, the contract or order was unlawful, for it is the law that all contracts must be made by authority of the board.

The new building to be erected by the Singer Manufacturing Company on the north-east corner of State and Washington Streets, on the site of Field and Leiter's retail store, which was partly burned, is intended to be a veritably fire-proof business-structure. Had it been only a question of repairing damages caused by fire, there would have been no special object in erecting a new one, as the fifth story and roof only were destroyed. But when an examination was made after the fire, it was discovered that not only the heavy double girders, but nearly all the floor timbers, were rotten to the verge of giving way under their own weight. They were broken in many places by falling objects during the fire, so that it became necessary to prop many of the floors to make it safe for persons to go about. It seems to have been providential that the building took fire. This fact, coupled with evident errors of construction committed during the erection of the building, left no alternative but to rebuild the interior at least. In view also of defects in the foundations of the exterior walls, which gave considerable alarm during their erection, the company concluded to rebuild the whole structure. And in consonance with the custom pursued by this corporation for twenty years (broken only in the instance in question), it determined to erect a fire-proof building. In carrying out this scheme, the architect in charge, Mr. James Van Dyke, who has come from New York for the purpose, has determined to avail himself of the results of recent investigation, and avoid the faults so generally incident to so-called fire-proof building. The task is not an easy one to fulfil; for the question of combustible contents is more serious than combustible building. It is to be a retail store, and may eventually become a wholesale warehouse. Iron beams, girders, and columns will be used throughout; but they with all other constructive ironwork will be fire-proofed by non-conducting materials. Elevators will also be protected from the danger of communicating fire. In the old building there were neither self-acting traps nor enclosed shafts, and three open elevators allowed burning embers to fall from the roof to the basement, causing considerable destruction by fire among the package goods there stored. The underwriters' report on this fire, just presented, reiterates the oft-repeated assertion that "elevators must be provided with automatic doors."

The details of interior arrangement are not yet fully determined, and may not be until a tenant is found. With regard to the exterior, the architect contemplates replacing the first story ironwork, and the stonework of the second, third, and fourth stories. That of the fifth story was so badly burned that most of it will have to be recut. A sixth story will be added, showing a mansard roof on the exterior, but protected inside and out from the effects of fire.

It is decided that Field and Leiter will not re-occupy the building, as they have rented five double stores on Wabash Avenue in the immediate neighborhood. It may be of interest to note, with reference to the prevalence of dry-rot in a building only five years old, that the internal construction of the old building was of iron columns and double girders; that is, the girders consisted of two beams 12 x 14 inches in dimension, placed one on the other, and bolted together. The floor-joists, 4 x 14 inches in size, were let into the upper girder, cut sloping, and rested on the lower girder. This system of floor construction in wide stores has been extensively practised in this city, and has failed in many instances through the prevalence of dry-rot. Already several stores have been found to be in a dangerous condition, and have been reconstructed in consequence. The decay seems to commence between the two girders. Many have been found in this condition. It is greatest at the ends bearing on iron plates, and rapidly spreads through their entire length. It is communicated to the ends of the joists where they are inserted in the girders. The superintendent of buildings has several of the ends of joists from the Singer building which are of the consistency of cork,—genuine examples of dry-rot. It is not found that the beams decay where they are built in walls and in contact with lime mortar. The extent of decay in timber has doubtless been aggravated by the extensive use of green timber during the days of hurried building. Altogether it is a strong argument in favor of the use of iron, which is now cheaper than ever before, and within the reach of many who could not have employed it a few years ago. The prospect of its extensive use in the future, coupled with the recent discovery of its weakness as a fire-resister, points with greater force than ever to the importance of adopting safe methods of constructing fire-resisting ceilings under the beams.

P. S.—Since writing the above, the following lucid opinion on the dome contract has been given by the county attorney:—

> The question presented is, Is there any valid contract between the county and P. J. Sexton for the building of the foundation of the county's portion of the Court-House dome?
>
> I find the following resolution in the proceedings of the board, of date July 20, 1877:—
>
> "*Resolved*, That the contractor, P. J. Sexton, be, and he is hereby, instructed to build as much of the foundation of the dome, under the supervision of the architect, as is necessary to enclose the building, subject to the architect's valuation of the same."
>
> In my opinion, the above resolution is binding on the county, provided Sexton did the work directed by the architect, necessary to enclose the building, in a good and workmanlike manner. The consideration to be paid is fixed by the valuation of the architect. Of course, if it should appear that the valuation fixed by the architect is so high as to be exorbitant, and to amount to fraud, then the Board have the right to fix the compensation at what the work is reasonably worth.
>
> The memoranda shown me amount to nothing, except so far as they supplement and are within the provision of the resolution of the Board. The whole matter can be considered without reference to them.
>
> Respectfully, M. R. M. WALLACE, *County Attorney*.

The county attorney has further explained to a reporter, that he has passed simply on the validity of Sexton's contract for the building of the "foundation" of the dome, and nothing more. Whether the contract covered all the work done, was not submitted to him. It seems also that the greater part of the last claim of the contractor is for cut-stone work used in the superstructure under orders of the building-committee.

MAY A CONTRACTOR CLAIM PAYMENT FOR VOLUNTEER ESTIMATES?

HARTFORD, CONN.

AN important case has just been decided in Hartford, before the city court, Judge Sumner on the bench. The case attracts attention because of the precedent which the decision is likely to establish.

A suit was brought against Trinity College by a stone-mason in the city, for so-called services rendered Mr. Kimball, the superintending architect of the new buildings, for estimates upon a portion of the intended work. In the fall of 1874, on the return of the architect from London to this country with plans and detail-drawings, it was found necessary, before accurate estimates were called in, to have approximate figures; and informal invitations were issued to several contractors and builders in the city, with the understanding that when final tenders for the work were called for, they should be invited to compete. The first estimates were rejected by the building committee, early in the following year, when upon examination it was found that to carry out the whole design would involve greater expense than had been supposed. Many important changes and modifications became necessary, as only a portion of the work could be built; and upon the cost of various parts of the work included in the modifications the plaintiff, at his own solicitation, was called on to offer estimates. Estimates of a similar character for stonework were also submitted by non-residents who volunteered their services. Early in April, 1875, a meeting of the college trustees was held, and an appropriation for building made, it being then decided what blocks should be erected. Up to this time and in the interim between the rejection of the first approximate estimates and the meeting of the trustees, it was thought that portions of the dining-hall and chapel would be built; and for estimating on those plans, and for time as above mentioned, the plaintiff brought a suit for the recovery of a bill presented. Plans for the buildings which it was decided to erect were finished and prepared for estimates by the middle of June, at which time invitations were sent out, not only to local contractors and builders, but to parties in New York and elsewhere, and all tenders were called in and opened on the 5th of July; the printed specifications stating that estimates would also be received for the dining-hall, and expressly announcing that the building committee would reserve the right "to reject any or all bids." The contract for light stone (upon which the plaintiff made figures) was awarded to parties out of town.

Failing to receive at the hands of the corporation "justice," so called, the mason, Brabazon by name, had recourse to law, the suit being instituted in December, 1877, and but recently decided. The

claim against the college was for the exorbitant sum of $1,500. This, the plaintiff explained to the court, was but a portion of what was actually due him, which he asserted to be $1,500, or in other words about 2½ per cent on the cost of the proposed work. The absurdity of the statement is apparent on its face; and if the validity of such a claim were fully established, estimating would at once become a popular and lucrative employment. During the trial some interesting developments were made. As an offset to the statement of the plaintiff regarding the time spent upon estimates for the architect, the diary of the latter was produced in court, and from it was read the daily list of visitors at the office, by means of which the time of the figuring mason was computed. The diary showed that during the months of January, February, and March the plaintiff made twenty calls, half of which were devoted to the work of preparing estimates. Among the witnesses were many prominent local builders and contractors, whose testimony regarding remuneration for estimates showed that it was not customary to make charge for this class of work. The defence was grounded principally on the fact that the plaintiff was not employed by the architect, that his services were volunteered, and that he did not take out accurate bills of quantities, but gave approximate estimates. In three days time other parties completed more accurate estimates than did the plaintiff in the three months in which he was making up his figures. In many instances the plaintiff was asked for figures on different parts of the work, because he was on hand, and time could be saved. Had the architect presumed that charges were to be made for estimates, a building surveyor, whose special duties are the preparation of exact bills of quantities, could have been employed at an established rate per day. The plaintiff made the accusation that his estimate had been used to make terms with other parties,—which was denied, and would have been a gross violation of the etiquette governing competitions. The decision rendered was in favor of the plaintiff, a weighty consideration being that the time and labor of one party had been given another party without compensation therefor, and that the plaintiff was in poor circumstances, while the corporation was wealthy (which, by the by, is a mistaken idea); and decision was made by the judge which awarded the plaintiff the sum of $200 in payment for his services.

By this decision a custom long established has been set aside; and if claims like that in the case above are always to be allowed, it is desirable that it should be known, and an additional item of expense will have to be considered. CHIPPWOOD.

BOOKS RECEIVED.

Ancient Mycenæ. Discoveries on the sites of Mycenæ and Tiryns, by Dr. Henry Schliemann. Published by Scribner, Armstrong, & Co., New York, 1878.

A Manual of Engineering Specifications and Contracts. By Professor Lewis M. Haupt. Published by J. M. Stoddart & Co., Philadelphia, 1878.

The Art of House-Painting. By John Stevens. Published by John Wiley & Sons, New York, 1877. Price $.75.

Cyprus: its Ancient Cities, Tombs, and Temples. A Narrative of Researches and Excavations during Ten Years' Residence in that Island. By Gen. Louis Palma di Cesnola, Member of the Royal Academy of Sciences, Turin; Honorary Member of the Royal Society of Literature, London. With maps and four hundred illustrations, etc. New York: Harper & Brothers, 1878.

Art Decoration applied to Furniture. By Harriet Prescott Spofford. Illustrated. New York: Harper & Brothers, 1878.

NOTES AND CLIPPINGS.

FALL OF A BUILDING.—A small brick building at the corner of Dwight and Delevan Streets, Brooklyn, belonging to the Cutting estate, which has been used for factory purposes, fell at one o'clock, A.M., Feb. 8, in a heap of ruins. The foundation is believed to have been undermined by rats, which are very plentiful about the premises.

BRIDGE ACCIDENT.—About seven o'clock, A.M., Feb. 10, one of the arches of the bridge over the Schuylkill River, at South Street, Philadelphia, fell, carrying with it in rapid succession nine other arches, and completely wrecking 300 feet of the bridge. The portion which gave way rested upon piles in the marsh on the western bank of the river, and its piling had been gradually sinking. A large number of workmen were engaged in shoring up the defective arch at the time the accident occurred, but all escaped uninjured. The bridge was built of iron, and cost originally $770,000. The loss by the accident will be about $100,000.

THE NAVAL MONUMENT.—The monument erected by officers and sailors, in commemoration of their comrades who fell during the war, has lately been finished at Washington. It stands on one of the best sites, near the western entrance to the Capitol Park. It is said to be more classic in treatment than any other monument in the city. Crowning the monument is a figure of Grief mourning for the fallen, and supported by History, who offers consolation by pointing to the record of their deeds. At the base in front, is a group of three figures, Victory holding aloft a laurel wreath and oak branch, and flanked by Mars and Neptune. In a corresponding position at the rear, is a figure of Peace, surrounded by emblems of peace and industry. Mr. Franklin Simmons was the sculptor.

THE NEW YORK STATE HOUSE.—The new Capitol Commissioners of New York, under Assembly resolution of the 11th ult., submit the following estimate of the cost of completing the new Capitol, including dome, laying out of grounds, etc.

Cost of building including dome:—

Granite		$1,120,857
Sandstone		1,193,068
Plumbing and gasfitting		55,425
Tiling of roofs		20,750
Iron-works		205,690
Carpenter-work		300,551
Brickwork		233,302
Plastering		102,500
Tiling floor		132,500
Marble		70,425
Heating		84,000
Elevators		120,000
Terrace:—		
Granite	$208,492	
Sandstone	370,829	
Brickwork	164,472	
Tiling	66,000	
Carpenter-work	20,540	
		849,937
Furniture		400,000
Taking down buildings and laying out grounds		150,000
Total		$5,198,045

The expenditure thus far has been $8,270,615.36, making a grand total when completed of $13,475,230.36. The commissioners say that both branches of the legislature and the executive may be placed in the new Capitol by Jan. 1, 1879, by the expenditure of $800,000. $300,000 has already been appropriated for the immediate commencement of the work.

AN ILLUMINATED CROSS.—St. Bernard's spire, Cohoes, N.Y., is to have a cross nine by five feet, made of 1,500 glass prisms. In the interior of the cross are to be numerous gas-jets, which will be lighted by the agency of an electric battery.

MINIATURE WATER-WORKS.—Blue Island is a suburb of Chicago of about a thousand population. To towns of similar magnitude, the following account of the water-works may be of interest: The works consist of a well, sunk at a cost of $300; a frost-proof stone tower, 50 feet high, costing $1,650; a tank weighing 10 tons, 18 feet high, 24 feet in diameter, and holding 58,000 gallons; and a windmill, 20 feet in diameter, having the power to lift 15 gallons per minute 90 feet high. The water has a pressure of 35 pounds to the square inch, and the hydrants are attached to a 6-inch stand-pipe connected with the tank at the bottom. The hydrants are supplied with 2-inch hose in such a manner that in case of fire the whole pressure can be turned on one hydrant in a few seconds. It is proposed that the water-mains shall extend from the town east on Vermont Street to Western Avenue, thence north and south. The Blue Islanders are very proud of this miniature water-works.—*Engineering News.*

A DECISION REGARDING SEWERS.—In the Circuit Court of Paterson, N.J., Judge Dixon has lately decided a question of considerable interest to municipalities. Mrs. Asahel sued the City of Paterson for damages caused by the flooding of her property during heavy rains, in consequence, as alleged, of the insufficient capacity of the street sewer to carry off the surface water. Mr. Williams, city counsel, asked for a non-suit, which Judge Dixon granted, on these grounds: The law authorized the city authorities to build sewers, and did not specify the size or capacity: those matters were left to the judgment of the authorities, who might make the sewers six inches or six feet in diameter; and so long as they saw that they were built in a good and workmanlike manner, according to their directions, the city could not be held responsible in damages to any person. Moreover, no one was responsible for damages resulting merely from surface water. This disposes of a large number of cases which were to have been brought against the city for damages on account of the failure of the sewers to carry off surface water.

BERLIN A SEAPORT.—In Berlin a scheme has been proposed for making the German capital a seaport. It is suggested that Berlin shall be connected, by means of a series of deep canals, with the Baltic and German oceans; the canals to be constructed to the mouth of the Oder in one case, and to the mouth of the Elbe in the other. It is said that only a few locks will be needed to regulate the influx of insignificant tributaries, and that the scheme is likely to pay a handsome return for the investment from the start.

A PANIC IN A FRENCH CIRCUS.—At Calais, France, during a performance at a circus, on Feb. 3, there was a false alarm of fire, which caused a great panic. Ten persons were suffocated or trampled to death. Several others were hurt.

TO KEEP NAILS FROM RUSTING.—The following treatment is said to keep nails from rusting. Heat a quantity of them on a shovel, and throw them, while quite hot, into a vessel of coarse oil or melted grease. The nails should not be so hot that the grease will be made to smoke freely. Cut nails prepared in this manner are improved in every respect. They are rendered tougher, and they will outlast any kind of wood, even though buried in the ground; while unprepared nails are completely destroyed by rust in a very short time. Probably melted paraffine would be still better than ordinary grease, as it forms a very effectual coating, penetrating the pores and preventing the access of air or moisture.

SELF-SUSTAINING MOTION.—A German has invented a clock in which the winding machinery is operated by the alternate expansion and contraction of glycerine or other suitable liquid, which act on a piston, motion in either direction serving to wind up the weight.

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WE took notice some time ago of the report of the Supervising Architect for last year, as it was made known through the papers. The printed report has now been issued, in its regular form of a slender octavo. It is as concise as it is its habit to be, containing memoranda of the condition and progress of the thirty buildings which have been in construction or under alteration in the Supervising Architect's office during the year; a statement of the appropriations and expenditures made thus far for all buildings now under construction; a list of contracts outstanding or completed during the year; and the usual tabular statement of the cost of construction up to date, of all the buildings in charge of the Treasury Department. These last now number one hundred and fifty-five custom-houses, sub-treasuries, post-offices, court-houses, mints, and other buildings, ranging in value from the New York Post Office, which has cost for site and construction, $8,984,706, and the Treasury Department at Washington, which has cost $6,618,304, to the two seal-fisheries in Alaska which together have cost $6,099. We recounted before (*American Architect*, No. 99) the chief recommendations and some of the facts of the report. It contains photographs of perspective designs for four new buildings,—the combined custom-houses and post-offices at Albany, N.Y., Austin, Tex., and Utica, N.Y., and the court-house and post-office at Harrisburgh, Penn.,—as well as a drawing showing some slight further emendations of the Chicago Post Office, which, as we are glad to infer from the report, must now, after all its vicissitudes, be fairly under roof. Mr. Hill's designs show a marked divergence from the Gothic work of his predecessor, Mr. Potter,—as Mr. Potter's did from those of his predecessor, Mr. Mullett,—being mostly in a *quasi*-Italian style, but treated with a good deal of freedom, and generally with breadth and massiveness that give them a dignity becoming their office, of which the designs for the buildings at Austin and Utica are good examples. It is rather to be regretted that it is not the habit of the Supervising Architects to publish plans of the buildings with their outward illustrations. It is impossible to appreciate the merit of an exterior without seeing the plan from which it is deduced; and if the similarity of requirements in different custom-houses and post-offices compels a certain monotony of planning, it is the more instructive to see how this is made to consist with variations in the exterior treatment. A concise description of the arrangement and construction of the new buildings, when they first make their appearance, would also, we think, add materially to the interest and value of the reports.

WE have received a printed report of the important case of Hunt *vs.* Stevens, to which we have lately alluded (*American Architect*, No. 109, Jan. 26, 1878). The report gives only the pleas and arguments of counsel, the charge of the judge, and the verdict: it does not give, what would have been of especial interest, an account of the testimony of the experts called as witnesses; so that it does not add materially to the information about the case before given in the papers. The turning-point of the case was the question whether the employment of a special superintendent by the client—a builder whom Mr. Stevens selected and paid, apparently of his own motion, as building superintendent and clerk of the works—should be held to have relieved the architect of responsibility for the excellence of the work; though it had been paid for on his certificates. There was not in the agreement made by Mr. Hunt with Mr. Stevens any such disclaimer of responsibility as one would have thought prudent in such a case. Mr. Hunt's expression being only that he waived a portion of his fees in consideration of the employment by Mr. Stevens of some competent person as superintendent and clerk of the works, thereby saving him time and trouble, while he still agreed himself to superintend the building as architect. It is likely that a client as wary and exacting as Mr. Stevens showed himself to be might have demurred at releasing his architect from responsibility, though he showed clearly enough that he preferred the mechanical supervision of a builder to that of the architect by his arrangement of deducting forty per cent—a large allowance—from his architect's commission, and paying it for Mr. Paul's services. However, the judge charged in effect that to thus deduct from the architect's commission for the purpose of paying a superintendent was really to relieve the architect from accountability for mechanical defects, in view of the statement in the memorandum that the abatement was in consideration of the time and trouble to be saved him.

THE charge of the judge on the matter of superintendence is of some importance, for it recognizes a distinction between kinds of superintendence which are and should be known to be different, though the distinction is very commonly ignored. The words are:—

"While the contract devolves upon the plaintiff the duty of exercising, as architect, a general superintendence over the construction of the building, to the extent of seeing that his plans and specifications are substantially adopted and followed, and that no essential deviation therefrom is permitted, it is to be construed as exonerating and exempting him from responsibility for mere defects in material or workmanship, and for want of mechanical skill on the part of the various artisans, mechanics, and laborers employed in the construction of the building, as well as from that close observation and supervision which would be requisite for the prompt detection of such defects."

There are, in fact, two different kinds of superintendence; and the difference, to which we have taken occasion more than once to call attention, is indicated as clearly as need be in these words of the charge. It is common for clients to confound them, and so far as they are performed in ordinary practice, it is usually expected that they will both be performed by the architect. Nevertheless it is quite desirable that they should be discriminated, and it would even be an advantage if distinct rates of compensation were assigned to them: because, in the first place, one of them cannot be properly performed except by an architect, while the other may by a builder; because, also, many clients who are willing to pay an architect for the first would prefer, like Mr. Stevens, to assume the second; and because the architect's regular compensation is not sufficient in most cases to cover the second if it is as thoroughly performed as many clients expect, and as it may be. The appointment of clerks of the works is the best device perhaps that has been adopted thus far to meet this emergency, and may be recommended as a valuable safeguard either to clients who fear that they shall not get as much attention as they expect from their architects, or to architects who have exacting clients to deal with; it being remembered that the architect retains the responsibility if the superintendent or clerk is his servant, and is relieved from it if he is the servant of the client.

A QUESTION at law which has just been decided in France, between the heirs of the famous painter Ingres and one of his patrons, touches an important issue of the rights of painters and their sitters, and perhaps one that may be made to

cover — as it certainly would be well if it could — some privileges and abuses of photographers. One of the most celebrated among the hundreds of portraits that Ingres painted is the beautiful portrait of Mme. Moitissier. He spent much labor over it, making a number of sketches and studies for it. These sketches he kept, as artists usually do. Not long ago the person into whose possession one of them had come, proposing to sell it, offered it first to M. Moitissier for about three thousand francs. M. Moitissier refused to pay this price, and demanded that the picture should be either given up to him or destroyed, claiming that neither the heirs nor the artist himself had a right to make use of the likeness of a sitter. The question was carried into court, and judgment was given that the sketches and studies made by an artist for a portrait were his property, and therefore should remain in possession of his heirs; but subject to the especial restriction that they could neither be sold nor exhibited without the permission of their subject or the persons interested in his behalf. This decision may be fairly considered as having a bearing by analogy, though a somewhat remote and indirect one, on the rule of practice which has never, so far as we know, been duly considered by the courts, though it is sufficiently settled by general usage, that the plans and drawings which an architect prepares in directing the construction of a building shall be his property rather than his client's.

It is not easy, from any thing we have yet seen, to infer the exact reason why the South-street Bridge in Philadelphia gave way last week. The piling on which the fallen piers rested was thought to be insecure, and the work of shoring it up was going on. But the bridge had been closed for travel only one day, which betokens a pretty narrow escape for those who were in the habit of using it. The accounts of quicksands and rotten piling are curiously at variance with theories that are broached of piers sliding out sideways and breaking off the arches like pipe-stems. The fact remains, however, that a bridge of solid, or apparently solid, masonry, which had only been in use for two or three years, and which ought to have stood for a century, suddenly went all to pieces, some four hundred feet of it falling bodily into the swamp it crossed. It is expected that it will cost $300,000 to repair it; but it might be worth while to make sure first how solid the construction is of the part which remains standing. The mayor, who was one of the commission that built the bridge, now proposes to replace the fallen part with a solid causeway, and calls attention to the fact that the Market-street Bridge, which was built just before the Centennial, its predecessor having burned, and which is crossed by the Pennsylvania Railroad, cannot be expected to last more than another year. He advises that this bridge be rebuilt in solid stone, and a hundred feet wide, — advice that we may hope will be followed, at least as far as material is concerned. Philadelphia has had the handsomest bridges in the country: it would become her to have the best.

The burning of the Excelsior Building in New York, which destroyed two churches with it, is one more warning against the unsuitability of our present methods of construction for our present forms of building. The Excelsior Building took fire in the basement, no matter how, and being provided with an open elevator-well, the flames were carried directly up to the seventh story, where they spread out under the roof. In a short time the bystanders saw a singular sight: the basement and the upper stories were all ablaze, while the second, third, fourth, and fifth stories were dark. The truth is, we have developed our buildings into new forms, while our construction has lagged, and is far too primitive for our present needs. It was comparatively safe to build small houses and shops three stories high, with wooden stairs, floors, and partitions, and open hoistways; but when it comes to putting up the huge structures of New York seven or eight stories high in the same way, we find that such a construction is outgrown and is fatal.

The Massachusetts strikes continue, and in some places serious disorders have again been threatened; but on the whole the position of the Crispins seems weaker, and the manufacturers are getting more independent by gradually filling their shops with outsiders. In Lynn, which has been the headquarters of the movement, there is comparative quiet, though the men, as represented by the board of arbitration of the Crispins, persist in their refusal to close the strike until the manufacturers discharge the new men. The manufacturers are willing to accept arbitration in the matter of wages, but reject it at the hands of the Crispin order, which they will not recognize, and positively refuse to dismiss their new hands; and so the deadlock continues, but with increasing advantage on the part of the manufacturers, who have now, it is said, some four hundred non-Crispins at work. The last accounts indicate that in London the masons, having spent something like thirty thousand pounds in a vain struggle, are growing disheartened, and the strike is giving way. Meanwhile there is an effort in Massachusetts by employers of women, on behalf of their operatives, and in direct opposition to all the aims of the trades-unions, to induce the State legislature to confer on women the right of making contracts for labor, and to repeal the law which *restricts* their hours of work to ten hours a day.

The question what shall become of the Castellani Collection is still undetermined. The hope of preserving it to this country grows less and less, as the impossibility of raising the necessary $150,000 appears clearer, but the trustees of the Metropolitan Museum of Art in New York have not given up their effort to secure its pottery. They think that it may still be possible to raise the sixty thousand dollars for which they hope to buy this part of the collection, although as yet only twenty thousand have been pledged. It is not likely that we shall soon again have the opportunity to secure so considerable a collection of pottery, or one so valuable; and it would be a decided check to the Museum if this should be taken away. United with the Di Cesnola collection, it would give at least the beginning and a broad foundation for a very ample and representative collection of pottery, one to which Americans would bring their additions from time to time with pride. Collections, like fortunes, grow rapidly after they reach a considerable size, and such an one as this would be a shining mark for patriotic contributions. The last word, however, received just as we go to press, is that the trustees have decided that Signor Castellani's price is too high, and that the collection is already packed to go to Paris.

It is perhaps not so much to be regretted if the negotiations for supplying New York with an obelisk have failed, considering the experience of the Londoners, who seem to find it even more difficult to make room for theirs than to bring it across the seas. The question of its position appears as far as ever from a settlement, and the last movement of Mr. Dixon has been to ask permission from the Metropolitan Board of Works to set it up at the top of the Adelphi steps, between Charing Cross and Waterloo bridges. The arrival at the London docks of the Cleopatra, as she is called, made quite a stir. Conspicuously painted, in red above the water-line, and yellow below, and with two red houses on deck, she attracted a great crowd as she was towed into the docks. Afterwards she was towed up and moored above Westminster Bridge, to give the public an opportunity of visiting her.

THE LABOR TROUBLES. — III.

Communism.

In our last article on labor we called attention to the tendency of working-men to form themselves into a class, and to use their collective force for the advancement of class interests over general interests; to the disturbing and even dangerous influence this tendency was likely to have in modern society. The most serious aspect of the case, however, we passed over for the time, and that is its communistic aspect. This, it seems to us, is so serious that neither politicians nor employers of labor are justified in overlooking it; so serious that it may, if it continues to grow as it has during the last ten years, at any time lead either to legislation of a very revolutionary kind, or to violent social disorders. The things that give weight to the movements of the working-men, and freight them with danger to society, are their coherence, and the fact that they almost all — whatever the forms in

which they show themselves, and wherever they are brought forward — involve attacks upon the right of possession, upon that security of property which is, after the security of life, the chief factor in all the progress of civilization, the chief bond of social order: in other words, they all mean communism. They are attempts either to compel an allowance from private means without giving what is commonly considered an equivalent for it, that is, to enforce a rate of wages above what the natural working of society fixes: or to extract a living from the public treasury, by ordering public works for the sake of making work, and fixing an arbitrary standard of wages; or by demanding actual subsidies from government, bounties, government loans, and distribution of public lands; by the abolition of the poll-tax without restriction of suffrage, that is, by claiming the right to spend the public revenue without contributing to it: or else it is by yet more aggressive measures, looking to actual spoliation or tyranny, by the dispossession, as proposed by the working-men's convention in San Francisco, of land-owners who have acquired more than they think proper, or by the plunder of corporations, or the abolition of contracts. Even the most moderate of these things are to be accomplished, not by the ordinary means which work social reforms, by discussion, negotiation, and the growth of public opinion, but by *force majeure*, by legislation for class interests, by the banishment of those who interfere with them, — the expulsion of the Chinese, — by taking away the right to labor altogether from those who do not support these movements; by striking and intimidation.

We are not prepared to believe that the majority of working-men accept all these aims as their own, yet they support the trades-unions that pursue them; nor that the trades-unions themselves will give their indorsement to all the means by which they are pursued, yet the means are used in their name, by their members, and with no real resistance from them. Even the extremes of violence to which the labor troubles have from time to time given rise, or the utmost pretensions of the agitators whose business it is to incite the working class to mischief, have never met with any adequate disclaimer, much less with any real resistance, from those in whose name they are urged and executed. Men in the heat of an eager struggle are seldom scrupulous with regard either to means or allies. It was in the name of the working-men of San Francisco that attempts were made to burn the Chinese quarter; and it was at the meetings of the same men apparently who have just framed their platform demanding the abolition of Chinese labor, and the sequestration of the property of land-owners, that Kearney proposed to lead his band of hoodlums to the City Hall, hang the government attorney, burn the laws, and distribute the property of the Pacific Railroad. The worst riots that have occurred in the country since the draft-riots in New York — which were themselves, if not instigated, at least inflamed, by class-feeling — were the result of the strike of the most respectable trades-union in the United States, the Brotherhood of Locomotive Engineers.

It is this recklessness of means, and this readiness to alliance with the criminal classes, that is the worst and the most threatening feature of the labor movement. It is perhaps not strange, when it is the doctrine of working-men that legislation ought to secure them the hours and wages they wish, and work to do whether it is needed or not, or aid and support when work is slack, when they are taught to think themselves entitled to a share in the profits of capital not of their own saving, — it is not strange that they should grow to depend more and more on the state as their savior from the trouble of getting a living, and the public as a community from which they are warranted in getting as much as they can, and for as little as they can give in return; that the line of demarcation between the working-man and the tramp should be so easily passed. The loss of the old gradations among workmen, the efforts of the trades-unions to level all down to one grade which necessarily approximates to the lowest, and the consequent facility with which men pass and repass between the conditions of workmen and vagrants, — all these tend to obliterate the wholesome distinction between the industrial and the idle classes of society. The aggressive propositions to which the political leaders of working-men have accustomed them to listen are of a kind to invite the support of the worst members of any population; and these, wherever they are at hand, gather round them by a sure predatory instinct, ready for any disorders, and delighting in opportunity for violence. That neither leaders nor followers are likely to stick at any allies, or any means, when it comes to a downright struggle, is clear enough to any one who reads the lesson of the last few months.

Nevertheless, before we set apart the working-men and their ignoble allies for too exclusive a condemnation on the ground of their tendency to communism, it is worth while in justice to them to remember some influences which, though they certainly do not excuse their measures, do encourage the tendency. The actual spirit of communism, veiled under various aspects, is a more prevailing thing than we often give ourselves time to consider. There are many conspicuous persons and even classes who set themselves in the true spirit of the trades-unionist to extort their living from the world with the least possible return of service to it. It is natural that the working-man should take his cue from those whose success is visible to him in the things in which he can best distinguish it, — in wealth and social or political influence. The very avocations of the men who are to him the nearest examples, the contractors for whom he works, make their success turn more on the cleverness with which they take advantage of the condition of the markets than on rendering a good return in work for their profits. He sees the greater part of the world he looks at engaged not so much in sober work as in an aleatory scramble, for wealth which, if it is secured, comes out of other people. The successful speculator is to him an example of a man whose success is in turning to his advantage the changes in his fellows' affairs, rendering absolutely no service to the world, but getting his part of its goods by mere cleverness of contrivance, and therefore taking what he gets from other men, or from the community, without an equivalent. He sees the successful politician neglecting the cares of good government to consolidate his party, and secure his living or his spoils. Both these are to him types of a kind of success which he can admire, and which is a mere tribute exacted from society. If he lives in a country where there is a hereditary aristocracy, he sees these, to him the most enviable of men, living on properties and privileges whose reasonable descent he cannot trace, and rendering no return which he can estimate; either living aloof in a luxurious privacy, or taking part in the world only to rule, which he, like his betters, regards as a privilege and not a service. We need not wonder greatly if he learns instinctively from the speculator to wring his prosperity from such chances to take advantage of his fellows as events put within his reach, or from the politician to give his energy to the ascendancy of his party rather than to his work, or from the nobleman to think that the world owes him support, or from all three to make it his ambition to live upon the world and not to work in it. The truth is that there is the essence of communism in the belief that the world owes anybody a living, or in the purpose to wrest a living from it without making any return; and it is the same thing in spirit whether it is held by a tramp or a footpad, by a workman or a granger, by a Wall-street speculator or a Prussian Junker, a ward-room politician or a king. With so many shining examples before him, we cannot wonder that the workman, who has no one to instruct him that the security of property is the foundation on which the fabric of civilization is built, should be tempted to rest his prosperity on the law of might, and contemn the rights of other people.

At any rate there are many things to remind us how slight, on the whole, the barriers are that defend modern society from anarchy. If any cause should unite, not one brotherhood or one trades-union, but the working class in the United States, in such a movement as brought on the railroad riots of last summer, it is hard to say where we should end. There is no sign of such a movement, but we cannot say that it is impossible. Society exists by the poise of a great many nicely balanced forces, constructive and destructive. Though it may not be immediately endangered by those we have been discussing, it is well to have our eyes open to the elements of instability that exist. It is not much, perhaps, that architects can do; but it becomes them, since they continually have to do with workmen, to keep some watch on them, to understand as well as they can their aims and feelings, and to be awake to what good influences it may be in their own power to favor.

PAPERS ON PERSPECTIVE.

IV.—THE DIVISION OF LINES BY THE METHOD OF TRIANGLES.

The third paper first set forth the convenience, in making a perspective drawing, of putting into perspective the plan of the object to be drawn, and of sinking this plan so far below the representation of the object as to get it quite free from the picture. Plate III. affords further illustration of the use of the perspective plan. The plan of the gate-house on the left is indeed below the picture, having in fact been drawn on another piece of paper, and removed, as suggested in a previous paragraph (47). But the plan of the one in the distance on the right is given, and it serves to determine all the principal horizontal dimensions. The plan of the principal building, the barn in the valley, is drawn above it, instead of below, as is sometimes most convenient, especially in high buildings, in the upper parts of which it is of advantage to have the perspective plan near at hand. It is often a convenience, also, to make several plans, set one above another, taken at different levels. In the plate, for example, we have first the plan of the walls, to determine the position of the doors and windows, and the apparent depth of the jambs, and then just above it the plan of the eaves, showing their projection, and the position of the brackets beneath them. As only the front part of the building is seen, only the front part of the plan needs to be drawn. In putting in the eaves, advantage is taken of the "vanishing point of 45°," V_3, to make them equally wide on each side.

In this plate the slope of the roofs and gables of this building, as well as of the smaller one with a hipped roof beyond it, is indicated by the same letters as in the previous plates, and their vanishing points accordingly by V^R, $V^{R'}$, etc., as before. The gables of the little gate-houses are so steep that their vanishing points are quite out of reach; and these gables are, in fact, drawn by the method of diagonals, as described in the previous paper (54). The slope of the steps is given by V^{St} and $V^{St'}$, and the trace of the inclined planes of the bank by T L M^1 and T L $M^{1'}$. Their position shows that the banks are a little steeper than the roof of the barn. The diagonal braces of the fence have nearly the same slope as the barn shed, converging to points just below V^S and just above $V^{S'}$.

In this plate the centre, C, is again quite out of the middle of the picture. The station-point, S, the proper position of the eye, is about six inches in front of C.

The previous paper then took up the first of the two methods by which a line given in perspective may be divided up in any given proportion. It was shown that this, though called the Method of Diagonals, finally leads to the division of such a line by means of a triangle, one side of which is formed by the line to be divided, and one side by an auxiliary line, drawn parallel to the plane of the picture in any convenient direction and divided in the given proportion. The points of division are transferred from this auxiliary line first to the third side of the triangle, by lines parallel to the perspective line, and directed to its vanishing point; and then to the perspective line by lines actually parallel to the auxiliary.

69. Both these steps are obvious and simple applications of the proposition that lines drawn parallel to one side of a triangle divide the other two sides proportionally. But it does not yet appear what is the real direction of this third side of the triangle, nor in what plane it really lies; that is to say, the vanishing point of this line and the vanishing trace of this plane are not yet determined.

70. The other method of dividing perspective lines, called, *par excellence*, the Method of Triangles, is a more direct application of the same principle. The auxiliary line, as before, is drawn parallel to the plane of the picture; but the points by which it is divided are now transferred directly to the perspective line by lines drawn parallel to the third side of the triangle. Plate III. is devoted to the illustration of this method. Fig. 7, 1 and 2, shows the difference between this method and the preceding. In each of the triangles here shown, the base is divided proportionally to the parts set off on the left-hand side. But in the upper ones the division is effected by the Method of Diagonals, as in Fig. 3, 5; in the lower ones the same result is reached, more directly and simply, by the Method of Triangles.

71. This application of the principle in question, however, though more direct and simple, is in one respect less easy of adaptation to lines given in perspective. For the two systems of parallel lines, employed in the Method of Diagonals, may be drawn without difficulty, the first having the same vanishing point as the line to be divided, and the second being actually parallel to the auxiliary line, since that line is parallel to the picture. But in the Method of Triangles the lines by which the points are transferred are parallel to the third side of the triangle, whose vanishing point is not known. It is accordingly necessary first to find the vanishing point of this line.

72. This may be done at once, when, as in the plan of the eaves, at the top of the plate, the plane in which the auxiliary triangle lies is known; that is to say, when its trace or horizon has been already ascertained. The auxiliary line here lies in the horizontal plane, and the given line lies in the same plane; the whole triangle is accordingly in the horizontal plane, and all its lines have their vanishing points in the Horizon. — the given line at V L, the auxiliary line at an infinite distance, and the third side of the triangle at V_1. This point is ascertained simply by prolonging this side until it reaches the Horizon. If now it is desired to find the position of the ten brackets that support the eaves, it is easy to lay off on this auxiliary line nine equal divisions, and to complete the triangle: by drawing lines parallel to the third side, the distances set off on the auxiliary are at once transferred to the perspective line by lines converging to V_1. This auxiliary vanishing point is called the vanishing point of proportional measures, or simply the point of measures. The auxiliary line also is called the line of proportional measures, or simply the line of measures.

73. It makes no difference, of course, at which end of the perspective line, the line of proportional measures is drawn, so that it is parallel to the picture. The relative position of the doors, windows, etc., in the lower plan, for example, are laid off at any convenient scale on lines of measures, drawn from their further ends, and the points of division transferred to the lines to be divided by means of the points of measures V_2 and V_3, both of which, of course, are also on the Horizon. But it is obviously conducive to precision to have the line of measures touch the nearer end of the line to be divided, since, in general, converging lines give more accurate results than do lines of divergence.

Neither does the size of the proportional parts laid off upon the line of measures affect the result. In Fig. 7, 3, the base of the triangle is divided into the same four equal parts, whether the parts taken on the adjacent side are large or small. Any convenient scale may be used; and that scale will in general be found most convenient which makes the line of measures about as long as the perspective line to be divided, and which brings the point of measures within easy reach.

74. In the same way a line lying in a vertical plane may be divided by means of a vertical line of measures; the point of measures or vanishing point of the third side of the triangle and of the lines drawn parallel to it being now in the trace of the vertical plane. If a line lies at the intersection of two planes, it is a mere matter of convenience whether the line of measures is taken in one plane or the other, or in which trace the point of measures is taken.

Thus the seven parts into which the length of the barn in Plate III. is divided may be taken either on a horizontal or on a vertical line; that is to say, upon a line of measures parallel to the trace of either plane. Thus in the left-hand side, the points at the bottom of the wall, which determine the position of the doors and windows, may be got either by means of a horizontal line of measures, as shown, with its point of measures on the Horizon, at V_1, or by a vertical line of measures, namely, the corner of the barn, on which the same proportional parts are laid off at a somewhat smaller scale, with its point of measures on the trace of the plane L Z at V_2. Here the first triangle lies in the horizontal plane, and the second in the vertical plane, the first on the ground and the second in the side of the barn, as they seem to.

75. If a line lies in a plane inclined to the horizontal plane, as each inclined line of the gable-ends of the barn lies in the plane of its roof, a similar procedure may be followed. A line of measures may be taken in that plane, touching the given line at one end and parallel to the picture, the point of measures being now in the trace of the plane of the roof.

76. And as in the horizontal plane a line parallel to the picture is horizontal, and in vertical planes vertical,—that is to say, in both cases parallel to the trace of the plane it lies in,—so in the case of an inclined plane, a line lying in it parallel to the picture is parallel to the trace of the system to which the plane belongs.

77. That this must be so, follows from the general proposition, that, if one system of parallel planes intersects another system, their lines of intersection are all parallel.

For a line lying in any plane, and parallel to the plane of the picture, may be regarded as the intersection of that plane by a plane parallel to the picture. But the trace of the system of planes in which the line lies is the line in which a plane parallel to that plane and passing through the eye intersects the plane of the picture. We have thus two inclined planes parallel to each other, intersecting two vertical planes parallel to each other. Their intersections are accordingly parallel, and the line in question is parallel to the trace of the inclined plane in which it lies; and since it is parallel to the picture, its perspective is parallel to itself, and also is parallel to the trace: *Q. E. D.*

78. Moreover, if any plane of that system of planes is extended so as to cut the plane of the picture, that intersection is also parallel to the others and to the trace in question.

79. The perspective of an inclined line can then be divided in any required proportion, as easily as that of a horizontal or vertical one, by drawing through one end of it a line of measures parallel to the trace of the inclined plane in which it lies, and taking the point of measures on that trace.

Thus in the plate the position of the brackets or purlins on the gable of the barn is found by dividing each slope into six parts, by means of a line of measures drawn parallel to the trace of the roof in question; and as the sloping lines of the gable lie not only in the plane of the roof, but also in a vertical plane R Z, parallel

to the side of the barn, the position of the six brackets can be found either by laying off equal parts, on vertical lines, with points of measures on the trace of R Z, at V_3 and V_4; or by laying off equal parts upon lines of measures parallel to the traces of the planes of the roofs, that is to say, parallel to T L M for the left-hand slope and to T L M' for the other, with points of proportional measures at V_3 in T L M, and V_4 in T L M', respectively.

In the former case the triangles lie in the plane of the gable-end; in the latter, each lies in the plane of its own roof.

80. It follows from the above, that if any object bounded by plane surfaces be cut through by a plane parallel to the plane of the picture, the line of intersection on each face will be parallel to the trace of the plane in which it lies. This is exemplified in the plate, where the dotted line, A A, running along the ground and over the barn, follows this law. If the front corner of the building were sliced off parallel with the picture, this would be the line of the cut. The same thing is exemplified on the front corner of the other building.

We shall find use for this by and by, when we come to the perspective of shadows.

81. Finally, just as in the Method of Diagonals we found at last that the auxiliary line, or line of measures, may be taken in any direction, at random, so here the same thing is true. For here too any line, drawn at random from either end of a perspective line, in any direction, may be regarded as the perspective of a line of measures beyond it, parallel to the picture and drawn parallel to the trace of the plane in which it lies. This trace then will be parallel to it; and since the plane contains the perspective line, its trace must pass through the vanishing point of that line; for the trace of a plane passes through the vanishing points of all the lines that lie in it (15 a); if then through the vanishing point of the line we wish to divide, we draw a line parallel to the assumed line of measures, we shall have the trace of a plane in which they both lie; and upon this trace the third line of the triangle, joining the other end of the perspective line with the last point taken on the line of proportional measures, will have its vanishing point. This point, the point of measures, can be found just as before, by prolonging the third line, the base of the triangle, till it touches it.

The principle that the line of measures may be drawn at random in any direction, the corresponding point of measures being taken on a line or trace drawn parallel to it through the vanishing point of the line to be divided, is illustrated in the division into five equal parts of the hip of the roof of the smaller building in the middle distance. Here the line of measures is drawn arbitrarily, at about 60°, the auxiliary trace being drawn through V^6, the vanishing point of the hip, and its point of measures, V_{15}, determined on that trace.

The triangle here seems to lie in the plane of the roof, but in fact it has nothing to do with it.

82. Moreover, since the only characteristic of this auxiliary trace, relatively to the conditions of the problem, is this, that it passes through the vanishing point of the line to be divided, it follows that any line drawn through the vanishing point of a given line may be regarded as the trace of a plane in which the given line lies, and will contain the point of measures corresponding to a line of measures drawn through either end of the given line parallel to it.

83. This gives us, in other words, this famous proposition:—

Of any two perspective lines having the same vanishing point, one may be taken as the trace of a plane passing through the other; and if a third line be drawn parallel to the first, and touching one end of the second, any parts taken upon this third line may be transferred to the second in their true proportions by means of a point of measures taken upon the first.

The position of the vertical bars of the cresting upon the ridge of the gate-house on the left is determined in this way, five equal parts being laid off upon a line drawn from the further end of the ridge parallel to the eaves of the roof, as a line of measures, and the point of measures, V_{11}, taken on the eaves.

The way in which the position of the vertical bars of the gate below is determined also illustrates this proposition. A line touching the top of the gate is drawn parallel to the ridge-pole, which has the same vanishing point, V_2. Equidistant points are taken on this line, and transferred to the top of the gate by a point of measures, V_{12}, taken on the ridge-pole. This reduces the labor of dividing up a given perspective line in any required proportion, to almost nothing.

84. Here, as in the corresponding case in the previous paper, care is to be taken not to fancy that the line of measures, and the triangle determined by it, really lie in the plane they seem to lie in.

In this last case the triangle lies in an imaginary inclined plane, and is no more vertical, as it seems to be, than the point of measures is on the ridge, as it seems to be; it is really in the infinitely distant trace which the ridge covers and coincides with.

Plate III. also furnishes illustrations of two points of general interest.

The first of these is the use of the point V_8, the vanishing point of horizontal lines making an angle of 45° with the principal directions, R and L, to determine V^8, when V^R is given, the lines that slope up to the left being supposed to make the same angle with the ground as those that slope up to the right. If these inclinations are equal, the inclination of the planes R N and L M will be equal, as in the case of these roofs; their lines of intersection, P, will lie in vertical planes making 45° with the principal vertical planes; their traces will be a vertical line passing through V_8, as shown in the previous paper (42); and V^P will be at the intersection of this trace with T L M. If now T R N be drawn through V^R and V^P, V^8 will be found at its intersection with T L Z, and $V^{8'}$ will be at an equal distance below.

The point V^{P_1}, which determines the direction of the line P_1, at the intersection of the two banks in the further corner of the barn-yard, is found in like manner.

The second point is illustrated by Fig. 8, which shows how the true direction of the lines Q or Q', whose vanishing points are at the distant intersection of the nearly parallel traces T R N and T L M', or of T R N' and T L M, may be obtained by means of the common device for directing a third line to the intersection of two given lines, as shown in Fig. 9.

This is applied in the plate, Fig. 10, to find the true direction of the left-hand line of the hipped roof, just below the point C.

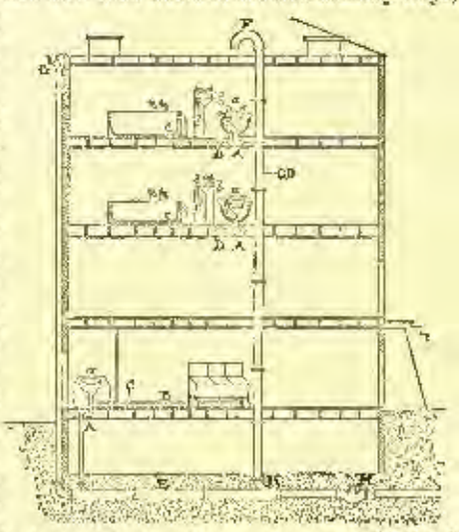
The next paper will treat of the exact determination of the directions and magnitudes of perspective lines.

THE SANITARY PAMPHLET OF THE NEW YORK BOARD OF HEALTH.

Some months ago the Health Department of New York City issued a pamphlet entitled "Defective Drainage of Dwelling-Houses." It was prepared by Drs. Russell and Post, Sanitary Inspectors, and Mr. Neatis, Sanitary Engineer of the Department. The pamphlet was widely circulated with the official indorsement of the Department.

It may be said at the outset, that a literal adoption of the directions set forth would lead to a decided improvement in the interior drainage of very nearly every city house in America. At the same time it would leave the house with grave defects; and it is to be regretted that the committee did not qualify themselves for their task by a fuller study of the subject, and that they did not make their diagram conform more exactly to their written instructions.

The diagram shows a four-story house, with a cellar where no water is drawn, a ground floor with water-closet and laundry trays, a main floor with no water, and a third and fourth floor each with bath, wash-basin, and water-closet. The main drain is buried under the cellar bottom, and runs from front to rear of the house. Near the front, but inside of the foundation wall, a running trap is indicated, with a handhole at the top. Farther back, there rises a main soil-pipe which passes through the roof, and is capped with a semicircular bend. The laundry trays on the ground floor stand near to the soil-pipe, but do not discharge into it. The appliances on the third and fourth floors stand near to the soil-pipe, and discharge into it through the outlets of the water-closets, which adjoin it. The laundry trays discharge by a long horizontal waste-pipe into the outlet of the water-closet which adjoins the rear wall. Below the point of junction, there is a trap from which a soil-pipe descends to the underground drain, quite near to the rear wall. This soil-pipe is neither ventilated nor vented. The underground drain passes beyond the rear foundation wall, and becomes the outlet of the rain-water spout from the rear gutter. We are justified in holding the authors to their diagram, because they say that "it exhibits all that is essential, and illustrates the vital principles of efficient house drainage." Our comments upon it are these:—



1. In place of the underground drain, we should recommend an iron soil-pipe, starting just under the ground floor near the rear wall, and running out just above the cellar bottom through the front wall. The running trap in this drain, we should place outside of the foundation wall in a covered well. We should make this trap a very deep one.

2. For rear ventilation, we should continue the soil-pipe, full bore, through and above the gutter, independently of the rain-spout, capping it with an Emerson ventilator.

3. We should admit fresh air to the soil-pipe inside of the running trap, by one of several devices adapted to that end.

4. The main soil-pipe (rising through the house) should not be turned over at the top, but should be capped with an Emerson ventilator.

5. If the water-closet on the lower floor must discharge into the underground drain, as shown, we should ventilate the top of its trap. Arranging the drain as indicated in paragraph 7, the direct ventilation would be sufficient.

6. The laundry trays should discharge with a trapped outlet into the soil-pipe which they adjoin.

7. The traps of the water-closets should be connected by an air-pipe with the upper part of the soil-pipe, above the highest connection of a waste-pipe, to prevent siphoning.

8. The bath-tubs and wash-basins on the third and fourth floors had better discharge directly into the soil-pipe, having traps close to each of their outlets. If to discharge through the water-closet trap, the pipes should lead into the dip of the trap, not into the air-space above the water-seal. If the trap at the basin and tub has a dip greater than the immersion of the outlet into the closet water-seal, it is this latter which will give way under the forcing effect of the flow.

9. Under no circumstances should such long horizontal waste-pipes as are shown leading from the bath-tubs and the laundry trays be permitted if they can be avoided; and in the case in hand they might be avoided.

10. In our opinion, for a private house, a six-inch soil-pipe and drain is needlessly and indeed injuriously large; the small flow of water constituting the waste of a single family will have its flushing power sufficiently taxed in keeping even a four-inch pipe passably clean. So far as the removal of obstructions is concerned, three-inch would be better than four-inch, but for free ventilation a four-inch pipe has decided advantages.

Turning to the text of the pamphlet, the following points seem to us erroneous. The traps indicated, it is said, will "retain sufficient waste water to seal them against the passage of gases." No water-trap will prevent the passage of gases, and in those shown there would be danger of siphoning.

We are told that gases permeate the water of the trap "when it has stood for a long time:" it has been known to pass entirely through an ordinary trap in fifteen minutes. It is recommended to curve over the soil-pipe above the top of the house: all curves offer resistance to the flow of air, and the course recommended is equivalent, so far as ventilation is concerned, to a reduction of the diameter of the pipe. It is recommended to ventilate "by a rear roof leader emptying into the sewer-pipes:" as Mr. Philbrick has shown, and as all sanitary engineers have known for years, this is a most dangerous and mischievous expedient. It is directed to drain yards and areas "by pipes emptying into the house sewer:" the manner of doing this should have been clearly indicated, for it is by no means easy to do it safely.

"A persistently wet cellar should be provided with a separate, blind drain *emptying into the trap of the house sewer.*" This is astounding! Better a "persistently wet cellar" (with ample ventilation) than even the possibility of the set-back of foul sewage which a drain arranged in this way is almost certain to expose us to. Such a drain should deliver, at whatever cost, into the street-sewer, or into porous ground. If into the sewer, there should be a decided fall to prevent the possibility of a set-back, a deep trap to prevent the return of currents of sewer-air, and an air-pipe back of the trap to insure the escape of air that may pass, in the event of possible unsealing, or by transmission through the water.

The pamphlet closes with a recommendation of the universally condemned bell-trap to protect the outlet of a privy-vault, — which privy-vault we should ourselves hardly undertake to recommend.

It is not to be questioned that the effort of the authors was laudable and praiseworthy, and we repeat that nearly every city house would be benefited as to its drainage by a literal following of their advice. It seems necessary to say, however, that instructions for sanitary drainage emanating from the health department of a great city should have been made to accord more nearly with well-known fundamental principles which are of record, and which are within easy reach.

THE ILLUSTRATIONS.

HOUSE OF WILLIAM MATTHEWS, ESQ., HARRISON, N.Y. MR. R. M. UPJOHN, ARCHITECT.

Mr. Matthews's house is at Harrison, Westchester Co. It is built of the stone of the country, with red and yellow stone finish. It occupies a commanding situation, and can be seen for a long distance. The interior of the building is carried out in a manner to correspond with the exterior, and is finished in hard wood.

ALTERATIONS TO THE BUFFALO RINK, BUFFALO, N.Y. MESSRS. OAKEY AND BLOOR, ARCHITECTS.

The drawings require little explanation further than to say that the rink runs through from Franklin to Pearl Streets, and that Pearl Street is seven feet higher than Franklin. This difference has been divided, making a flight of steps up from Franklin and down from Pearl. The total length of building is two hundred and thirty feet, the width within walls ninety feet. The passage through the centre is twenty-five feet wide, and the galleries above are set back as shown in order to gain light. The main construction is the system of laminated wood ribs originally built to cover the whole space: upon these is built the open timber work and skylight; immediately below these ribs is a decorated sheet-iron cove; the balconies and bridges are of cast and wrought iron. The offices on the second and third floors are mere sashes and wood finish, while the shop-fronts on first floor are of brick, stone, iron, and plate-glass. The passage is paved in tile, and all interior brickwork will be Toronto brick with red bands, red joints, and white limestone finish. The exterior is sufficiently shown by the elevation, the *cossoirs* being composed alternately of lime and Medina stone, and on the exterior the cornice above is of brick and stone, the spandrels being filled with encaustic tile. The window over the entrance arches at each end will be tinted lead lights.

HOUSE AT ST. PAUL, MINN. MR. A. M. RADCLIFF, ARCHITECT.

This house was built in St. Paul last spring. It is of wood painted and sanded. Its greatest length is 54′ 8″, the greatest breadth is 34′ 10″. The basement is used principally for a laundry and work-room. The attic is used partly for a billiard-room. The contract for this house was taken at $5,500, exclusive of heating apparatus.

THE SUMMER HEADQUARTERS OF WILLIAM M. HUNT, ESQ., AT MAGNOLIA, MASS. WILLIAM RALPH EMERSON, ARCHITECT.

"The Hulk," so called from its fancied resemblance to an old stranded ship, with its ropes for lifting the gangway stairs, its davits for raising the doors of the carriage-house, and the employment of whale ribs and vertebræ for braces, railings, and ornamental features, was built by adding an old barn and carpenter's shop together at Mr. Hunt's suggestion, and affords accommodation for horses, carriages, sleeping-quarters, and a large painting-room.

PERSPECTIVE STUDY. PLATE III.

See the "Paper on Perspective" in this number.

REPORT OF THE ELEVENTH ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.

[Held at Boston Oct. 17, 18, and 19, 1877.]

SECOND DAY'S SESSION, OCT. 18 (*continued*).

The report of the Finance Committee was submitted by Mr. Longfellow.

The report of the Finance Committee was accepted, and Mr. Longfellow offered a resolution prepared by the Committee, appointing a Committee of Ways and Means, which should take especial consideration of the best means to increase the membership of the Institute, and of its financial condition, and levying instead of the regular annual assessment a special tax for 1878 of fifteen dollars on every Fellow not member of a Chapter, and half that sum on every other Fellow, and on every Associate not member of a Chapter, and remitting the direct dues of Associates belonging to Chapters; directing, also, the said Committee to present to the Convention an estimate for the expenses of the year, and to levy upon the Chapters a tax, in ratio of membership, sufficient to make up the portion of such estimate not provided for by the special tax on members.

Mr. Haight objected that the resolution took from the Trustees certain functions which they were required by the By-Laws to exercise, and vested them in the new committee proposed.

He raised a point of order that the change proposed involved a change in the By-Laws, which could not be made except after twenty days' notice.

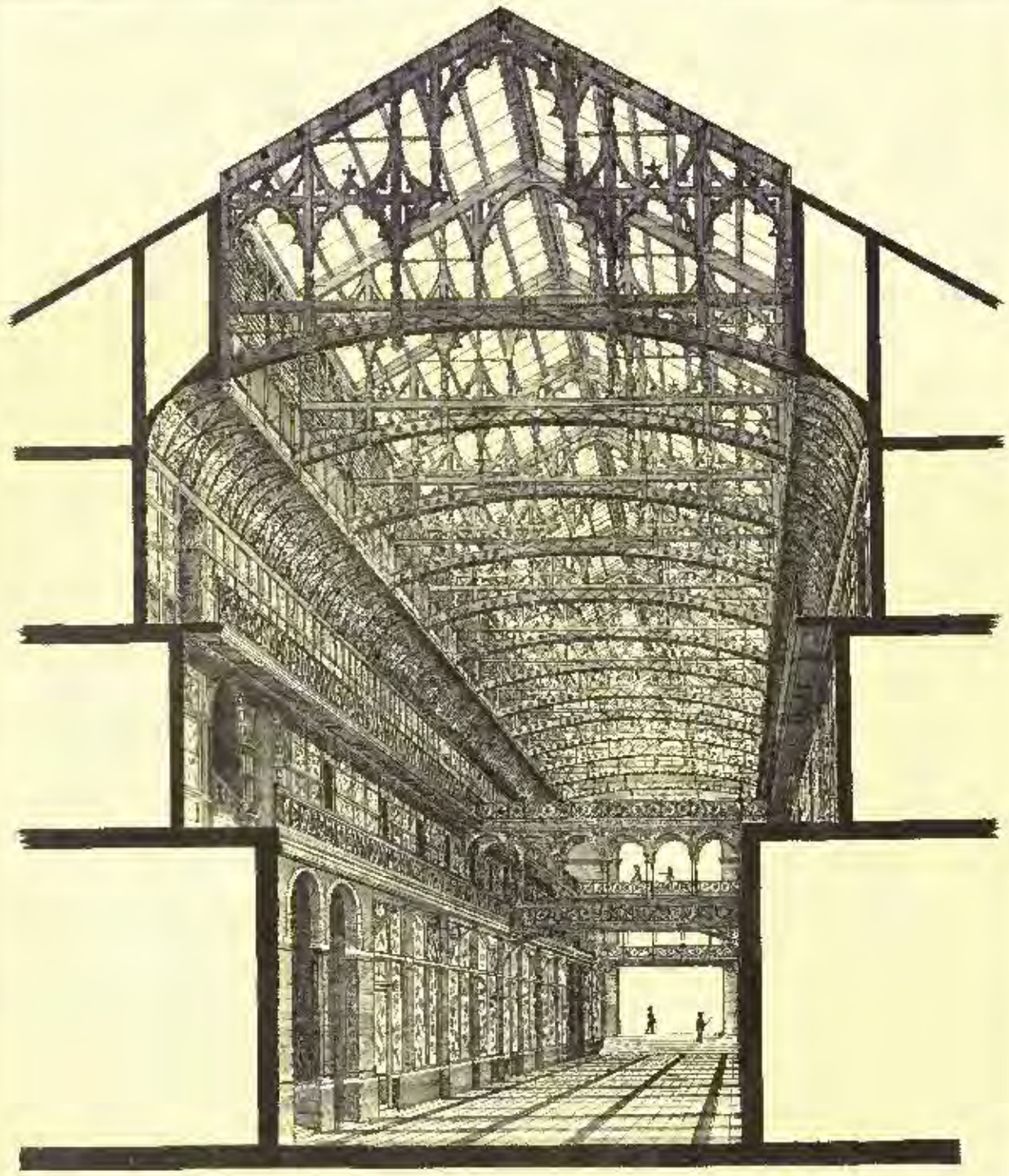
Mr. Longfellow said that the Committee had thought that it might be desirable to have an expression of opinion from the Convention on the point of order raised by Mr. Haight. He thought the by-law relating to the subject could be temporarily suspended by a vote of the Convention, in conformity with the general usages of similar bodies.

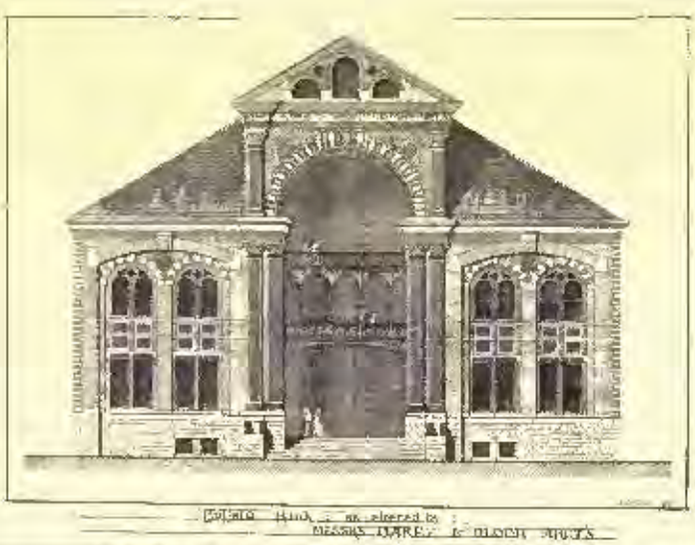
In regard to Mr. Haight's remark that the proposed committee would take away some of the duties of the Trustees, he thought that new duties were rather created, which might indeed be given to the Trustees instead of the new committee, if the Convention so desired; the point of the proposition was in the duties to be performed, not in the persons who should perform them.

In regard to the financial measures advocated, he wished the opinion of the Treasurer.

Mr. Hatfield said that for the first time in the fifteen years in which he had been Treasurer, there was this year a deficit, due, undoubtedly, to the action of the Convention last year in reducing the income of the Institute by about twenty-five per cent. The hope that the reduction of the dues would attract new members had proved fallacious.

The measures proposed by the Committee on Finance struck him in some respects favorably, while in other respects he feared there might be difficulty in raising the money as proposed in the resolutions. As far as the prerogatives of the Trustees were con-





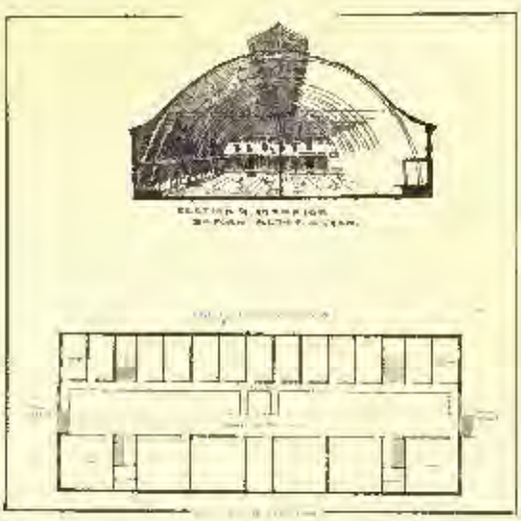
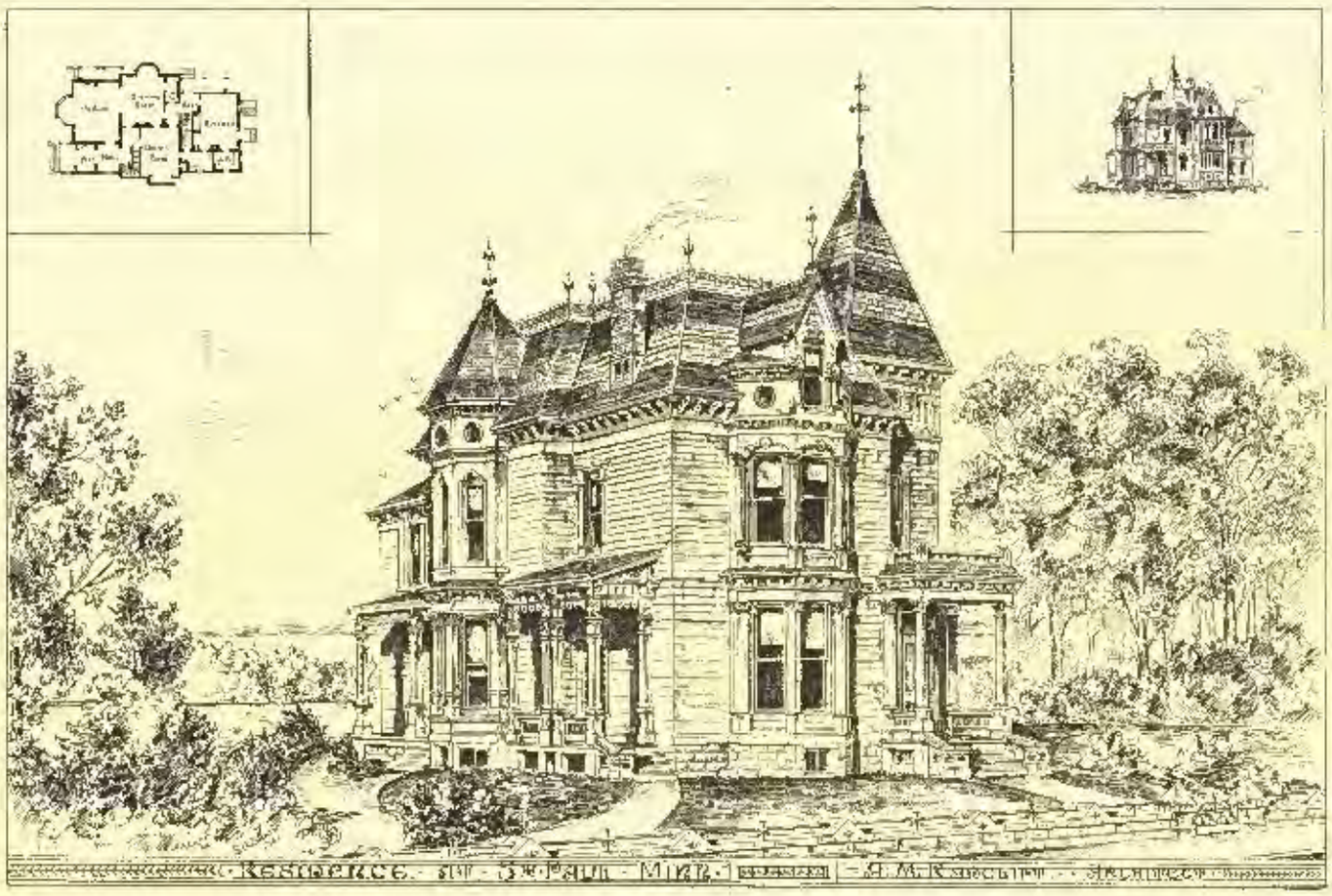


PLATE III. DIVISION BY TRIANGLES.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10.

HOUSE OF WILLIAM MATTHEWS, ESQ.
RM UPJOHN ARCHT. NEW YORK.


RESIDENCE

"THE HULK."
W. M. HUNT & Co.
SUMMER HEADQUARTERS
AT MAGNOLIA, MASS.

cerned, he thought it very proper that a Committee of Ways and Means should be appointed out of the Convention, the legislative body, whose recommendations should be carried into effect by the Trustees, as the executive department, in the manner proposed; and he thought such a committee might be of great assistance to the Trustees.

He thought the proposition to consider the resolution under a suspension of the by-law requiring notice to be given of any change, might, if carried into effect, render difficult the collection of the Institute dues from some members who were not attached to any Chapter, and whose payments were to be increased by the resolution.

They might complain that they were not represented at the Convention, not belonging to any Chapter, and that they had a right to the prescribed notice of any change in the By-Laws affecting them.

MR. WHITE remarked that the action of the previous year, in reducing the dues from members twenty-five per cent, was a compromise between the views of certain Boston and Chicago members, who urged a reduction of fifty per cent, with the object of increasing the membership, and those of the Treasurer and other gentlemen, who opposed any reduction; and was satisfactory to neither. It was a hasty, and he thought, unwise action. He thought the proposition of the Finance Committee a wise one, and a nearer approximation to what some of the members wished to have done last year.

MR. HATFIELD read some statistics showing that within the past three years there had been a considerable falling off of membership.

MR. WARE proposed two amendments,—that the part of the Committee's resolution relating to changing the dues of Fellows not members of Chapters should be stricken out; also, that a clause should be added, that the suspension of the By-Laws should not take effect till it had the unanimous consent of all the Chapters. The committee accepted both Mr. Ware's amendments.

MR. HATFIELD proposed to amend the Committee's resolution, so as to make the assessment on all Fellows who are members of Chapters ten dollars. Adopted.

MR. HAIGHT spoke against the resolution, as substituting an indefinite for a definite provision of money to meet the expenses.

MR. LONGFELLOW explained that the Committee's proposition provided just as definite a revenue as the old method, taxing the Chapters in some cases and members in others, but all in a fixed sum, instead of taxing each member a fixed amount. He thought the Chapters were as likely to meet their obligations as individuals, and the revenue was therefore as certain in one case as the other.

MR. WARE suggested, in answer to those who feared that the scheme of the Committee might be defeated in the Chapters, and therefore the Institute be left with a deficit, that the Treasurer should by vote of the Convention be authorized to levy *pro rata* upon the Chapters a sufficient amount to make up any deficit which should become apparent during the year. In this way, if the Committee's scheme were defeated, the deficit would be provided for, and if not, there would be no deficit.

MR. MCARTHUR asked if the amount to be levied on the Chapters was indefinite, so that the Trustees might expend at their discretion, and the Chapters would be assessed for the amount.

MR. HATFIELD and MR. STONE remarked that the Committee proposed was to report before the adjournment of the Convention the estimates for the year, and also to determine the deficit, and report the same to the Trustees, and levy the assessment on the Chapters.

The resolution of the Committee as amended was then adopted as follows, by a vote of 13 to 2.

Resolved, That a special Committee of Ways and Means for the coming year be appointed by the Chair,—said committee to consist of three (3) members, one of whom shall be a member of the Board of Trustees, whose duty it shall be to take special consideration of the best means to increase the membership of the Institute, and of its financial condition. The Committee shall present to this and the next Convention estimates of the probable expenses of the ensuing years, according to which the amount of money to be raised for those years shall be determined. The action of the By-Laws which regulate assessments shall be suspended. That for the year 1878 the Institute shall levy upon every Fellow not a member of a Chapter, an assessment of fifteen dollars; and upon every Associate not a member of a Chapter, an assessment of seven and a half dollars; and upon every Fellow member of a Chapter, an assessment of ten dollars. These assessments shall be collected by the Treasurer of the Institute in the usual way; and no other assessments shall be levied by the Institute on individual members. The remainder of the sum required by the estimate of the Committee of Ways and Means shall be levied by a tax upon the several Chapters in proportion to their number of members, both Fellows and Associates, said tax to be adjusted by the Committee, and submitted to the vote of the Convention; provided that this resolution shall be submitted to the votes of the Chapters, and unless it is accepted by them, the method of levying the revenue herein set forth shall not be adopted. Carried.

MR. HATFIELD remarked that the resolution as adopted did not embody the last suggestion of Mr. Ware.

MR. WARE moved that the Finance Committee, in case the scheme should not be accepted by the Chapters, be authorized to levy a tax *pro rata* upon the Chapters to make up the deficit. This was adopted, and the Convention adjourned till evening.

EVENING SESSION.

The Convention met at eight o'clock, President Walter in the chair.

The President appointed the following gentlemen a Committee on Ways and Means: Messrs. Longfellow, Stone, and Richardson.

Papers on Religious Architecture were then read, by Mr. Cady, Mr. Peabody, Mr. Cummings, and Mr. Haight. Mr. Ware also read a paper sent by the Rev. J. H. Hopkins.

Discussion of the papers was deferred, to give place to the report of the Nominating Committee presented by Mr. McArthur.

The Convention proceeded to a ballot, with the following result:—

President, Thomas U. Walter, of Philadelphia.

MR. WALTER accepted in a few words, and on motion of Mr. McArthur the thanks of the American Institute of Architects were presented to the retiring Secretary, Mr. A. J. Bloor, as follows:—

Resolved, That the thanks of the American Institute of Architects be presented to the retiring Secretary, A. J. Bloor, for the indefatigable and faithful performance of the duties of the office for a period of four years.

Resolved, That these resolutions be suitably engrossed, and communicated to Mr. Bloor.

Carried.

MR. LONGFELLOW declined the office of Secretary for Foreign Correspondence, on the ground of other pressing duties; and the Nominating Committee were requested to present a substitute.

MR. STONE suggested that it was desirable that the Associates should avail themselves of their right to become Fellows; then there would be no difficulty in filling the offices.

A resolution was offered by Mr. McArthur, and adopted, that the Secretary should if possible notify the members of the Board of Trustees at least one month in advance of a meeting, of the subject which is to come up for discussion at the meeting.

MR. BLOOR offered the following resolution, touching a recommendation of the report of the Board of Trustees:—

Whereas, It is of the first importance to the advancement of good architecture in America, that the public administration of the building service of the country should be infused with the scientific and artistic elements which belong to the profession of architecture, and not left to the merely mechanical tendencies which at present prevail in it; and

Whereas, A Committee on Examinations such as exists in connection with the New York Chapter, and which has official relations with the local building authorities, is obviously the most practical vehicle for reaching and influencing the governmental authorities; therefore

Resolved, That the Chapters of the Institute be recommended to organize Committees of Examination to act with their local building authorities, and spare no efforts to get the building service throughout the country into the well-organized condition, not only as regards utility and safety, but as regards beauty and architectural harmony, which prevails in the principal cities of Europe with results so satisfactory alike to the resident and the traveller.

The resolution was referred to the Board of Trustees.

MR. WARE, on behalf of the Committee of Arrangements, called the attention of the Convention to the remark in the President's address, that "the interest of architects demands, and the interest of society demands still more, that a proper diploma, after proper examination, should be given to architects before they are allowed to practise;" and offered a resolution that "in the opinion of this Convention it is important to adopt some means by which persons who have never pursued any systematic course of architectural study, and are wholly unfit to take upon themselves the responsibilities of the profession, may be distinguished from architects who have been properly trained, educated, and prepared for the practice of their art." Mr. Ware proceeded to say that suggestions of this sort had been made repeatedly both in this country and in England, but hitherto, partly from the reluctance of the profession to take the first steps, and partly perhaps from a sentiment in the community unfavorable to any form of privilege or exclusiveness, nothing had been done in either country. A change had manifestly begun in public feeling on this point, however, one indication of which might be seen in the frequent appeals in the newspapers for some means of protecting the community against incompetent practitioners; and it seemed as if a proper time had arrived, if not for doing, at least for considering what might be done in this regard.

MR. LONGFELLOW thought a resolution of the kind proposed was in itself inoperative. If a movement could really be made in the direction suggested, it would be very desirable that the Convention should express its mind as to any means for carrying out the movement; but it was a difficult question, and one which should not be taken up unless there were symptoms of a distinct outside impression that some action was necessary. Within two days the Boston papers had made a sort of appeal to the Convention to take the matter in hand, and he thought discussion very desirable. He proposed that the matter be referred to the Committee on Professional Practice, with instructions to report at the next Convention, or at this if they found it practicable.

MR. WARE suggested that the passage of the resolution would throw on the Committee on Professional Practice a great deal of labor, and would require them to take the responsibility of solving a very difficult question which had hitherto baffled the skill of the

profession both here and in England. He hoped therefore that before the resolution passed, they might have the views of the gentlemen present, and especially of the President, whose suggestion it was.

The President thought it impossible to treat such a question by discussion in convention, or even in the occasional meetings of a committee. He thought it should be referred to the Committee on Education, rather than to that on Professional Practice, and offered an amendment to that effect. The resolution was adopted with this amendment.

The Auditing Committee announced that they had found the Treasurer's report correct, and the report was accepted.

The Treasurer remarked that the new scheme of finance did not take effect till the next year. The deficit shown on the report was for the six months only since the last system had been in operation; and as this system had six months yet to run, the deficit at the end of the year would be double that shown.

The Convention then adjourned.

FRIDAY, OCT. 19.—MORNING SESSION.

President Walter in the chair.

The President thought that instead of publishing the proceedings of the Convention in pamphlet form, it might be as well to print the report in the *American Architect and Building News*.

It appeared that this journal had a larger circulation than the pamphlet reports had had, and it was voted that it be henceforth the medium for publishing the proceedings of the Conventions.

The report of the Boston Chapter was passed over by vote, and that of the Rhode Island Chapter taken up for consideration, and the subject matter finally referred to the Board of Trustees.

A desire having been expressed that the report of the Rhode Island Chapter should be published, the matter was referred to the Committee on Publications.

Mr. R. S. Peabody read a paper prepared by Mr. McKim of New York, on "Colonial Architecture."

Mr. Loring of Chicago read extracts from a paper on Terra-Cotta, showing what had been done in that material in the last four years.

It was voted that Mr. Loring be empowered to publish portions of a recent paper on Terra Cotta by Mr. Sturgis, to which his own paper was in part an answer, with his comments thereon, in connection with the records of the Convention.

The Committee on Ways and Means then reported the following estimates for the expenses of the Institute for the year: —

Secretary's expenses	$500
Treasurer's "	200
Expenses of the Convention	150
Committee on Publications	250
Reporting Proceedings	100
Editing Report	100
Incidental expenses	227

The report was accepted.

The Committee on Nominations reported that Mr. Longfellow, who had been chosen Secretary for Foreign Correspondence, and had declined, had withdrawn his declination, and would discharge the duties of that office.

Mr. Ware called attention to the provision in the By-Laws by which a member elect is required to send to the Board of Trustees drawings and specifications of some of his work, saying that some good architects were unwilling to submit to this provision, and he would move that the trustees be instructed to waive it, where, in their judgment, it should be desirable to do so.

Mr. Stone thought this would be unwise. The Board of Trustees might appoint one of their number to receive such drawings, etc., which might be less objectionable to the candidate than having them submitted to the full board, but he thought the provision should not be abandoned.

Mr. Ware accepted this amendment.

A suggestion was made that the Presidents of the Chapters might be authorized to examine plans submitted by candidates. One of the Trustees remarked that they had found a general reluctance on the part of elected members to comply with this regulation of late years. No definite plan was agreed upon, and the subject was dropped.

On motion of Mr. Ware, the Board of Trustees was requested to consider and report to the next Convention on the advisability of a change in the constitution by which practising members of the Chapters should be *ipso facto* members of the Institute, without another election by the Board of Trustees, the election by the Trustees being then required only in the case of candidates not members of any chapter: —

The following resolution was proposed and adopted.

Resolved, That the Board of Trustees be requested to confer with the proper authorities of the United States Government with a view to inducing Congress to authorize the Treasury Department or War Department to make practical tests of all so-called fire-proof materials and methods of construction, and make reports thereon.

Mr. Ware announced that the Boston Society of Civil Engineers had placed in his hands a communication relative to the metric system. Referred to the Board of Trustees. It was voted to recommend to the Board of Trustees to arrange for the next meeting of the Convention at Washington, D.C.

Votes of thanks were passed to the Government of the Massachusetts Institute of Technology, for its kindness in placing a room at the disposal of the Convention, and other courtesies; to the Trustees of the Boston Museum of Fine Arts, for the invitation to visit their building; to the committee in charge of the Old South Church, for an invitation to inspect the Loan Collection; and to the Boston Chapter, for its entertainment and civilities.

Mr. Ware invited the members to inspect the new mechanical workshops connected with the Institute of Technology, and see for themselves what the Institute was doing for professional technical education.

The President of the Boston Chapter, Mr. E. C. Cabot, then delivered the following address, after which the Convention adjourned *sine die*.

CLOSING ADDRESS.

I am glad of this opportunity of saying a few words to you, and of expressing the feelings of cordial fellowship which the members of this Chapter feel towards their professional brothers from other cities. We hope we may have succeeded in making your stay agreeable. We all feel glad to receive you in Boston, to show you what we are doing, and to ask your advice and sympathy.

In your walks about the city, you have had an opportunity of examining some of the most important works which have engaged us. Less than twenty years ago all this district of the city, where we now are, was water or mud flats: so that all the buildings are of recent date. A great calamity which at the time seemed irreparable swept away most of the business portion of our city; yet to-day one can hardly point to any trace of that terrible experience; and the district which it laid waste is now covered with finer, and, I hope, more durable structures. An examination of these sections of the city will show pretty well the present condition of architectural taste and ability amongst us, and will, I trust, be found creditable.

Some of us who can look back nearly half a century remember on this same burnt district pleasant old-fashioned streets, full of trees shading sumptuous mansions surrounded by broad gardens, and miss the air of quiet gentility which old Boston presented before the business prosperity of the *city* required the destruction of these comfortable homes. Now when that old colonial architecture is receiving so much attention, we look in vain for those refined examples of wood and iron work which we so well remember in those old houses.

Then followed a period when the master-builder had lost his respect for precedent: and, having things his own way, replaced this interesting work by blocks of granite stores in long dismal rows which seemed almost as if turned out by machinery. Their only merit, that of apparent substantialness, proved but a poor dependence.

Thirty years ago, when I commenced practice in this city, there were but half a dozen architects, and several of these had been bred as engineers. There was but little sympathy between them; their designs were carefully guarded from each other, and their libraries kept locked. We had few books of reference, and photographs were almost unknown. Twenty years later, a few members of the profession, which had in the mean time rapidly increased in numbers, proposed to form a society of architects, and called a meeting of all persons who were practising in the city. About fifty assembled. Some articles of association were drawn up; a portion of those present signed them, and formed the Boston Society of Architects. This society, now a Chapter of the Institute, has held regular meetings since that time; at first fortnightly, and afterwards once a month. The meetings were at first well attended, and much interest was shown in the discussions. Then followed a period when but few came; but the effort of those few was earnest for the best interests of the profession; and, as young men joined our ranks, the meetings have increased in interest, and it is not unusual to have twenty members present.

A topic for discussion is always announced previous to the meeting; sometimes a subject of practical or æsthetical interest, and sometimes a building. The discussions are made as informal as possible, — architectural conversations, as it were.

Of late the Chapter offers annual prizes for the best work in the architectural school of the Institute of Technology, and also to encourage excellence of workmanship among the mechanics of the city.

The result of all this has been to promote amongst us the most friendly professional relations. As artists, we cannot live without sympathy; and through the earnest love of our work and this cordial intercourse we must look for the elevation of our professional practice.

Galvanized Iron. — It is stated that one firm in Pittsburg produces a large part of the galvanized iron used in the manufacture of cornices, window-tops, sills, etc., in this country. The sheets of iron are rolled, and after being dipped in acid to remove all scales and make them smooth, are dipped in the zinc or spelter, and drawn out of the pans or vats, first-class galvanized iron. Sheet-iron coal-buckets are first manufactured, and then zincked by the dipping process, and in this way are made water-tight.

PAINTING AND SCULPTURE AT THE CENTENNIAL EXHIBITION.—III.

[The report of Mr. John F. Weir in behalf of the judges of Group XXVII., embracing Plastic and Graphic Art.]

GERMANY.

GERMANY'S exhibit, as a whole, in painting was one of but average merit, and we looked in vain for the works of some of her more distinguished artists. It was, however, so far characteristic as to enable us to form a just conception of the leading tendencies of this school.

German art is divided into two distinct schools, — those of North and of South Germany, — and there are few points of resemblance between them. The art of Northern Germany is inspired by the influence of the Düsseldorf school; that of South Germany by the school of Munich. The former is almost exclusively devoted to *genre*: the latter has been devoted to history-painting; and their styles are quite as distinct as those of two separate nations. The Munich school rose into prominence through Overbeck, Cornelius, Schnorr, and Kaulbach; while the Düsseldorf school achieved its high reputation through Schadow, Lessing, Bendemann, Camphausen, Hildebrandt, Richter, Hübner, Becker, Knaus, the Achenbachs, and others, who have made recent German art favorably and widely known. The Munich school has of late in a measure forsaken its strict adherence to history, and as a school of art-discipline it is a formidable rival of the famous *École des Beaux-Arts* in Paris, in some respects perhaps surpassing the latter. With the character of Düsseldorf art we were made familiar in this country some twenty years since through the "Düsseldorf Gallery" in New York, which for some time formed a great attraction, and was a very adequate exponent of the merits of this school. German art is always pure in sentiment, generally, of late, domestic in character, and actuated by the influence of subject rather than treatment. In technical qualities it is usually monotonous in color and precise in execution, not imaginative in any suggestive or subtile way, but carefully wrought out in story. These may fairly be said to be its more prevalent characteristics; but there are not lacking superior qualities in the productions of German artists of the first rank that are unsurpassed in any school: this is particularly true of the works of Ludwig Knaus.

In historical painting the German school is often formal and conventional, intellectual rather than emotional, cold and dry in execution; but in domestic subjects the prevailing sentiment is always cheerful, healthful, and pure. In landscape, with the exception of a few distinguished painters, — the most notable being Andreas and Oswald Achenbach, — the rendition is decidedly formal and mannered. Portraiture in landscape is more generally the aim, and there is little attempt to draw from the inspirations of nature the simple elements of form and expression which in the French school have made this branch attain the highest level of art.

In the German exhibit the most attractive landscapes were "Storm at Vlissengen," by Andreas Achenbach; "Harvest in Holland," by J. von Starkenborg; "In the Park," by F. Hiddemann; and "Environs of Munich," by R. Von Poschinger. Mr. Achenbach's picture was not one of his best, but it gave a good idea of the admirable quality of his art. "The Venetian Nobleman," by C. Becker, was likewise not adequately representative of this artist's best qualities. There are much finer examples of his work in some of our own private collections.

In portrait-painting the most notable works were C. Richter's portrait of the Hon. George Bancroft; the Crown Prince of Germany, by C. Steffeck; and "A Lady with a Rose," by G. Graf. There were no pictures of superior and conspicuous excellence in this collection, so that it is difficult to select any for special mention. The collection, as a whole, was one of about equal or average merit; and, while representative of the general characteristics of German art, it hardly did justice to individual artists of this school.

In sculpture the German exhibit was not important, — a bust, in marble, of Count von Moltke, by L. Brunnow, and a colossal bronze statue of Prince Bismarck, by H. Manger, being the most noteworthy.

AUSTRIA.

The exhibit of Austria in painting was a very creditable one, though the distinctive excellence of the collection was due to the conspicuous merit of a few works of unusual power, — notably Hans Makart's immense canvas representing "Venice rendering Homage to Catherine Cornaro," which, in richness and splendor of color, in largeness of composition, and in facile freedom of execution, is well worthy of high praise. This picture attracted a great deal of attention at the Vienna International Exhibition, and has been greatly commended by the press. It is of a style of art that is essentially decorative, but in that large sense in which many works of the Venetian school are so classed. The motive, or theme, is one which seeks expression through the medium of color rather than in form or the other elements of pictorial art; and in this particular it is one of the most successful attempts of recent art. The drawing does not exhibit that knowledge of the human form which is a first requisite of the leading schools, but as a triumphant display of the charm and power of color united with a large style of composition it is in many respects masterly. It is also a successful manifestation of independence in art, guided by a true artistic instinct; and this is to be commended when successful, as it is in this case, in view of that tendency to exalt accuracy of detail at the expense of expression. A portrait study, by Charles Probst, has exceptional merit. The expression and attitude are very natural, and the technical treatment skilful. It was one of the best portraits of the Exhibition. Two portraits by Henry von Angeli are characteristic, though not representative of this artist at his best. It would have added greatly to the interest of the Austrian exhibit had Von Angeli contributed something in *genre*, — as, for instance, such a work as "The Avenger of his Honor," which is widely known. "The Page," by J. Canon, is particularly pleasing; the coloring is rich and harmonious, reminding us somewhat of Rubens, and the execution is free and finished. "Bathsheba," by A. George Mayer; "Paul and Bacchantes," by Eugene Felix; "Girl of Upper Austria," by Ernest Lafite; "The Nun's Reverie," by G. A. Kuntz, — are all works of merit, though not excellent if we apply to them a high standard of criticism.

In landscape, Austria did not exhibit works of decided merit; and perhaps nothing in this branch of art was more pleasing than the pictures of Louisa von Parmentier.

In water-color painting the pictures of Ralph Alt are worthy of mention; and in etching the exhibits of W. Unger deserve high praise; they are admirable in some of the finest qualities of this art.

While it is not an uncommon thing to confound the art of Austria with that of Germany, a very decided distinction subsisted between the exhibits of the two nations. There was a marked evidence of a recent advance in the progress of Austrian art, which finds no better illustration than in the works first cited, particularly in that of Hans Makart.

BELGIUM.

Belgian is closely related to French art. It is well disciplined, vigorous, and generally unconventional. The Belgian exhibit was one of the best; and, though we missed some names that would have given completeness to this representation, — such as Gallait, Wappers, Baron Leys, Alfred Stevens, Willems, Lamorinière, and Alma Tadéma, who exhibited elsewhere, — nevertheless the collection, on the whole, showed favorably the characteristics of this school.

"The Confederates in the Presence of Marguerite of Parma," by Franz Vinck; "The Sculptor," by Victor Lagye; "Dante and the Young Girls of Florence," by N. de Keyser; "Saturday in the Monastery," by Franz Meerts; and "Griselda," by Jules Wagner, are the most prominent works in *genre*; and in landscape, "After the Rain," and "Before the Thunder-storm," by G. Van Luppen; "Mill on the River Scheldt," by Jacques Rosseels; "Autumn," by F. Keelhoff; and "Using the Life-Boat," by Th. Weber, are the most favorable examples. "Deception," by Jean Portaels, though disagreeable in expression, exhibits great skill in technical treatment. "A Christian Martyr in the Reign of Diocletian," by Ernest Slingeneyer, was one of the most powerful and impressive pictures of the Exhibition. There is a solemn thoughtfulness in the conception of this admirable work, which places it in the foremost rank of recent art. Too high praise cannot be awarded those manifestations of true art that rise superior to the ordinary level of external qualities which are apt to be over-esteemed at the present time. There is a silent power, a true dramatic interest, that stimulates the moral sense, in this picture, which cannot well be too highly commended. While we find the sensibility pleasingly affected by technical surprises, it is rarely that our deeper feelings are stirred as they are by this solemn and effective picture by Ernest Slingeneyer.

Belgian art has had a decided influence on the art of Northern Germany; and geographical influences have in turn largely affected the style peculiar to this school. The influence of France on the one hand, and that of Holland on the other, are not infrequently perceptible in Belgic art, which nevertheless has distinct qualities of its own that render this school deservedly famous.

In sculpture, A. F. Bonré contributed several studies of animals, and P. Comerio some terra-cottas, that are worthy of mention.

THE NETHERLANDS.

The exhibit of the Netherlands was fairly representative of the admirable qualities of recent Dutch art. While there is evident adherence to the traditions of this school, there are not lacking strong suggestions of external influences that are rapidly demolishing old distinctions of this kind. With such a mighty ancestry of famous painters, it would be strange if Dutch art were not of high order of excellence; and something of this influence may be found in the works of C. Bischop. Two portrait studies, entitled "At Church" and "Dienwke," were unsurpassed by any thing of the kind in the whole Exhibition. Admirable in expression, in force of chiaroscuro, and in richness of coloring, these pictures are worthy of highest praise. The tones are clear and deep, and the roundness and relief of the forms are rendered with great skill.

"The Deacons of the Silversmiths' Guild Conferring a Certificate," by J. A. Streebel, while tending toward the conventional, is nevertheless admirable in many estimable qualities, broad and simple in treatment, and pure in tone. "The Card-Players," by J. Israels; "On the Beach," by J. Boeboom; "Gamblers, Seventeenth Century," by H. F. C. Ten Kate; "Norwegian Women," by H. A. Van Trigbt; "Hauling up the Fishing-Boat," by A. Mauve; "Haymaking in Normandy," by W. C. Nakken; and landscapes by J. W. Bilders and J. F. Van Deventer, are well worthy of special commendation; and "Still Life," by Miss M. Voss, was quite superior to any thing of its class in the Exhibition.

On the whole, the exhibit of the Netherlands in painting was a favorable one. Wherever there is evidence of a proper adherence to the style and methods that have prevailed with so much credit in the past, Dutch art maintains a high place, and in some respects, as in the works of Bischop, has qualities that are unexcelled at the present time. Landscapes and cattle-pieces abounded, and in *genre* there were not wanting examples of conspicuous merit.

CORRESPONDENCE.

THE SAMENESS OF PARISIAN FAÇADES. — PECULIARITIES OF PARISIAN BUILDING-LAWS. — FIRES IN FRANCE. — THE PALACE ON THE TROCADÉRO.

PARIS, Jan. 20, 1878.

Almost simultaneously with the Boulevard St. Germain, on the left bank of the Seine, the new Avenue de l'Opéra was opened. It runs from the Palais Royal to the new Opéra, and gives for the first time a fair view of the latter. Had this avenue been finished at the same time as the Opéra, the latter would have escaped some of its severest criticisms, for the great projection of the *foyer* and staircase hall formerly masked much of the main building. Although, perhaps, no sites in the world are more conspicuous or coveted than those on this avenue, I doubt if any one here looked forward with particular interest to what these buildings would be architecturally, and so no one is surprised to find them just like all other *maisons-à-loyer*, with shops on the ground floor. What with the uniform requirements of such apartment houses and the strict city building laws, they have grown to be regarded as a fixed type in which no novelty can be expected.

The American architect on taking his first walk in Paris is generally attracted by the fine details he sees on all sides. Orders, mouldings, cornices, and graceful *garnaches* are well studied. But before long he awakes to the fact that whether near the Luxembourg or the Parc de Monceaux, there is great monotony in the unbroken blocks of these handsome five-storied façades. Fifth Avenue with its rows of brown-stone porches is not more monotonous; and then Fifth Avenue is not repeated all over New York. There are two reasons for this sameness of frontage. The first is that hired apartments are the usual lodgment of the population, the different stories corresponding to the various grades of wealth; and the proprietors build them to meet the average wants of lodgers. Like all ready-made articles, they have little variety; for any personal fancy or caprice of the builder, to which the picturesqueness of streets is generally due, might injure the value to the average lodger. So a certain number of stories, windows, and balconies become the natural if not necessary thing. The more of the latter, the better; for, though rarely used, an apartment with one commands a higher price. Again, as the height of the stories, with projection of cornices and balconies, are regulated by strict building laws, the problem to introduce variety is no easy one for the best trained architect. Strange to say, the *maisons-à-loyer*, of which Paris may be said to be composed, are not built by such, but by what are vulgarly called "*boutique*" (shop) architects, who rarely have had careful training either at the *Ecole des Beaux-Arts* or elsewhere. They have as draughtsmen succeeded to a business, or from influential connections stepped into a good practice. Not having the habit of making original designs, — for few of them are called to build any thing but this one kind of building, — they accept the current type.

On the other hand, the young men who enter the *Ecole des Beaux-Arts* are generally poor and unknown. Even if they gain the coveted *Grand Prix*, which annually sends a student to Rome for four years, and on their return as *protégés* of the government have a chance at the public buildings, they, however celebrated, get little private practice. The wealthy banker or proprietor has personal acquaintances to whom he intrusts his building; and one can count on one's fingers the private edifices by well-known architects in the last hundred years. The result is that the best architects are ill off; and the costliest private architecture of Paris varies but in the sculpture of the consoles, or in the pattern of the gilt scrolls in the white-walled salons. In America we are apt to look to Paris as a city where art is fully appreciated; but one hears among architects quite as much about the stupidity of the public in architectural matters as at home. Of course every thing is relative; but it is certain that the French public is far less ignorant in all that relates to painting and sculpture than in the matter of architecture, which should really be the art of the people.

I mentioned above the building laws, which are very complete; and especially in that vexatious subject of party-walls and obligations are most explicit. The strictness in regard to their façades is not however so conspicuously an advantage. No façade can have more than five stories, nor exceed twenty metres in height, and must then have a court-yard of at least forty metres area, and this height only on thoroughfares of at least twenty metres wide. There are three other classes of heights, varying with the width of the street. The height of roof cannot exceed one-half the depth of the building. Cornices cannot project more than the width of the wall at its summit. Balconies are only allowed by special permission, and then in streets ten metres wide; and except this no construction is allowed on corbelling. The minuteness in regard to placing signs is at first sight ludicrous. For instance, names of streets must be five centimetres (2 inches) higher than the street-lamps. Flags are forbidden, and cloths and drapery can be used as signs only by the dyers. Lights and reflectors projecting more than 16 centimetres (6¼ inches) must be unmounted when not in use, or else allowed to burn all night, etc. This excess of regulations has however its virtue in matters of hygiene: for example, no story can be less than 2.60 metres (8½ feet) in height; and no room lighted or ventilated by a well can be used as a sleeping-room. No well can have less than four metres (10¾ square feet) area. Water-closets must have direct ventilation with the open air, etc. Twenty days before breaking ground, the architect must send a complete set of drawings to the authorities to be sanctioned; and a geological section of the ground turned up in the excavations must be sent in. Another notice is sent when the foundations are finished, and again before the roof is put on. Besides this, there is continual government inspection to prevent bad or unhealthy construction. No chimney-flue can communicate with another. They must be round or with rounded corners, and cannot be carried obliquely at an angle greater than 30°. No chimney-flue or wall of fireplace can be within 16 centimetres (6¼ inches) of a wooden partition or construction. The strict laws, and habit of using incombustible materials, almost preclude serious fires; and one can live years in Paris and never see a burning building. In four years I have seen one, and that, though unchecked, merely burnt through from front to rear on the same floor, and did not pass through ceiling nor floor. This is the usual extent of the fires; so the law, which makes the owner of the apartment where it originated responsible for all subsequent damage done, appears less preposterous. For putting out fires quite mediæval laws still exist, and are in full practice in the provinces. The police have the right to catch any passer-by, and make him or her help in putting out a fire. One evening at Tours, on my way to an entertainment, I was suddenly arrested and ordered by an officer into a gang of men and women passing buckets of water to a fire out of sight several blocks off. As I was in evening dress I expostulated; but, to the high satisfaction of the gang, I was thrust into it before the bayonet of one of the soldiers guarding it, for all were watching an opportunity to desert. Later a man was chased and cut at for running away. However, after getting thoroughly wet, I finally made my escape. It is no wonder that a French crowd runs from a fire as quickly as ours do to it. The French fire department seems primitive beside our fine organization; and undoubtedly our engines are the most powerful in the world, but let us hope we may learn to do without them.

There is another interference of the government in building, which would perhaps harass us more than any of the preceding cases. That is their high tax on building, in the form of a fixed tariff on nearly all external features: for instance, one franc per square metre for façade wall; balconies, from ten to twenty francs per metre in length according to the projection; per metre, window-guards pay five francs, gutter-pipes ten francs, Venetian blinds twenty francs, etc. Signs and all ornaments whether sculptured or painted are also taxed, as well as scaffoldings and temporary obstruction of sidewalks. Surely such sumptuary laws ought to cut down profusion and useless ornament.

Since writing in my last letter about the Palais du Trocadéro, I have found some details in regard to the great circular theatre which is to be used for concerts and distribution of prizes. It is to be 50 metres (162 feet) in diameter, with an orchestra or stage for 400 musicians, but so arranged that part of the parquet can be taken in and room made for 1,200 performers. The whole number of seats will be 6,000, of which 1,000 are in the amphitheatre. A large organ at the back of the stage will have bellows worked by steam. The height of the ceiling is 32 metres (113 feet). The whole is to be lighted by 4,000 gas-jets, and the ventilation will be effected by numerous reservoirs of hot and cold air. Among the curiosities to be exhibited at the "*exposition rétrospective*" in the circular galleries of this building, are the principal pieces of sculpture and architecture obtained a few years ago by M. Delaporte in his government expedition to Cambodge, and which have been stored at Compiègne. There are "several finely carved statues of Buddha, a statue with eight arms, two kneeling giants with five heads and ten arms, two women nude to the waist, etc., capitals, entablatures, etc., exquisitely sculptured." The first part of the catalogue certainly sounds like a travelling circus show; but as they are of colossal size and from the ruins of Kimers, it will save their reputation.

The last street novelty is the construction of two small light-

houses on the Pont de la Concorde, which are to throw an electric light upon the façade of the Trocadéro, some twenty minutes walk down the river. Summer before last, driving home in the evening from the Bois de Boulogne, one saw the Arc de Triomphe brightly illuminated, and could trace the light to a pencil of rays coming from the new skating rink, — a capital advertisement. R.

NEW YORK BUILDING-STATISTICS.

New York.

THE report of the Superintendent of Buildings for the year 1877 shows some noteworthy facts which illustrate the drift of architectural work in this city. More buildings at less cost would seem at first blush to indicate a meaner style of work, a poorer grade, and a lower class of work; but it is questionable whether this be so. Every indication points to the conclusion that it is the cost and not the quality which has been reduced; in other words, that we can build as well and as extensively as we did a half-dozen years ago, at something like one-half or three-fifths the price. The mechanics stand idle, material is offered at incredibly low prices, and contractors are ready to estimate on very close margins. There have been a great number of dwellings erected at costs below $10,000, to be occupied by families able to pay a rental of from $25 to $35 per month; plain, substantial, comfortable residences for the middle classes, now the best-provided and most secure portion of the community. Several important buildings have been projected during the year; among them the Seventh Regiment Armory to cost $150,000, and the Jauncy Court buildings on Wall Street to cost $225,000. In taking the figures it must be borne in mind that the estimates are placed upon the plans by the owners themselves. Generally they are the figure given by contractors, and for the average dwelling and tenement a glance at the sizes would detect any glaring irregularity in the estimates; but the finish in the interior may make a very great difference between houses otherwise similar; and as the building department is mainly concerned with questions of strength and stability the inspectors are content when these are secured, and pay little attention to finish or ornamentation; but on the whole, the estimates are pretty fair. Now and then some speculative builder will mark up the price to assist him in selling to advantage; but with the usual practice of buildings to overrun rather than underrun their estimates, the figures below may be very near the truth. The rule about including public buildings is somewhat mixed in practice. Nominally the superintendent has entire control over all building operations within the city limits, but in the case of public edifices this is not strictly enforced: thus the Court House extension, now under the superintendence of Mr. Lidlitz, which is to cost nearly $500,000, does not appear in the reports. Nor do the anchorages and series of great arches and viaduct under the East River Bridge Co.'s control appear in the report. School-houses and engine-houses come for register, but seemingly only by courtesy to the building superintendent.

Taking merely the general figures for the past year, in comparison with the previous year, the statistics show: —

	1876.	1877.
Plans for new buildings submitted	760	773
No. of buildings included in same	1,570	1,432
Estimated cost	$15,809,240	$13,340,414
New buildings begun	1,491	1,376
" " completed	1,277	1,201
Plans for alterations submitted	1,090	1,226
No. of buildings affected	1,177	1,208
Estimated cost of alterations	$3,635,478	$3,215,125
Alterations begun	1,028	1,135
" completed	1,072	1,217

Of the 773 sets of plans for new work submitted, 710 were approved, and 54 rejected. Of the 1,226 plans for alterations, 1,160 were passed and 66 were rejected. Of the new work in progress over the city, there were on Jan. 1, 1877, 651 jobs, and on Jan. 1, 1878, 726. In alterations the figures stood on Jan. 1, 1877, 125; and on Jan. 1, 1878, 134. In connection with this matter of building statistics, I have been at some pains to go back over the record, and have collated all the official figures which are accessible. Prior to June 1, 1866, no registration of plans had been attempted. Under the old fire-wardens, plans were looked at and approved; and in the first stages of the building department, plans were usually stamped and returned to the owners. The figures below, therefore, are for each calendar year since 1866, and for that year only from June 1.

Of buildings judged unsafe from any cause, the work of the department has been carried as follows: —

Year.	Made safe.	Taken down.	Total.	Year.	Made safe.	Taken down.	Total.
1866	225	33	257	1872	398	38	436
1867	335	22	357	1873	819	58	877
1868	235	23	257	1874	1,466	67	1,533
1869	305	38	343	1875	1,586	90	1,676
1870	478	52	530	1876	1,331	71	1,402
1871	892	62	954	1877	1,088	67	1,155

The following table is a complete exhibit of the work of the department for the past eleven and a half years. It would seem from it that the average cost of a new building in this city has been $13,741, and that with some additions of work not formally reported to the superintendent, the aggregate sum spent in adding to the plant and material on Manhattan Island has reached the enormous sum of about $360,000,000. The falling-off in the trade within the past few years is very manifest. The alteration column seems to run along with great regularity, in numbers as in cost; but of new work the falling-off has been most marked. The table is a new and interesting one, and could serve as the basis of no slight argument and discussion for our builders and architects, but without further comment I give it: —

Year.	Plans submitted.		No. of buildings.		Estimated costs.		
	New.	Alterations.	New.	Alterations.	New.	Alterations.	Total.
1866	478	70	917	70	$6,856,097	$293,150	$6,859,155
1867	1,164	328	1,585	358	23,029,580	2,209,157	27,229,743
1868	994	918	2,012	573	33,223,504	2,157,945	35,381,488
1869	1,395	1,225	2,518	1,325	40,251,088	4,226,174	43,559,262
1870	1,206	1,101	2,233	1,312	32,646,421	3,761,621	36,411,047
1871	1,416	1,281	2,518	1,473	37,360,016	4,051,951	41,951,967
1872	1,009	1,173	1,781	1,318	21,644,330	2,786,579	24,732,709
1873	853	1,013	1,511	1,130	22,276,615	3,496,975	25,773,640
1874	878	1,033	1,388	1,429	16,786,077	3,562,147	20,348,224
1875	819	1,201	1,406	1,258	14,230,770	3,200,478	21,437,205
1876	760	1,090	1,570	1,177	15,809,240	3,635,478	19,533,718
1877	773	1,226	1,432	1,208	13,340,414	3,215,125	16,564,539
	11,639	11,462	20,912	12,170	$285,143,031	$37,594,780	$319,737,820

W.

THE GEOLOGICAL FOOTPRINTS AT BELLONA, N.Y.

CHICAGO, Jan. 30, 1878.

EDITOR AMERICAN ARCHITECT AND BUILDING NEWS.

Sir, — In your issue of Jan. 5, in the "Notes and Clippings," on page 8, there is an item accredited to a correspondent of the Rochester *Democrat*, in regard to "Geological Footprints in the limestone bed of Kashong Creek," at Bellona, N.Y., which might mislead. Professor Berlin H. Wright, who has examined the so-called "footprints," says that they are not footprints at all, but simply are the result of the combined action of the atmosphere and water, dissolving and washing away the softer portions of the limestone. His opinion is indorsed by his father, Professor S. Hart Wright, A.M., Ph. D., also by Professor S. Botsford Buckley of Austin, Tex. Professor Buckley obtained in Clark County, Ala. (many years ago), the fossil bones of the zeuglodon now in the Warren Museum, Boston, Mass. All of the above-named gentlemen are familiar with the geology of that locality. Professor James Hall, State geologist of New York, also indorses Professor Wright's theory. Professor B. H. Wright says that the stone is the "Tully limestone," and that it is overlaid with the "Genesee slate," and the slate is overlaid with the drift of the "glacial period," which have since been worn away. I glean the above from letters published in the local paper, — Yates County *Chronicle*.

SCRIBO.

NOTES AND CLIPPINGS.

WATER TANKS. — Alfred Wright, Secretary of the Chicago Board of Underwriters, has issued the following circular, dated Jan. 10: —

In view of the disasters which have resulted from the location of water-tanks in the upper stories of buildings where fires have occurred, and with the conviction that similar or still more calamitous consequences are likely to follow where such destructive agencies are permitted to exist, this board is forced to insist upon the observance of the following stipulations in their construction and arrangement: All water-tanks, if constructed of wood, must be open at the top; if of metal or other material than wood, they shall rest upon a foundation of brick, or some walls of solid masonry, or upon heavy iron girders, both ends of which shall rest upon solid brick or stone walls. On all buildings (with their contents) having water-tanks not constructed in conformity with above standard, a charge of not less than 10 cents per $100 will be added to the basis rate. This action shall take effect from this day; but on any building now provided with tanks not conforming to above requirements, if altered and constructed in compliance therewith before March 1, 1878, this charge of 10 cents will be rebated. If the change be not effected before March 1, then the rebate will only be allowed from the date of the improvement.

THE OLD SOUTH CHURCH. — The following statement concerning the Old South preservation fund may prove interesting: There has been paid for building and land, $409,000, and in addition for interest on mortgages and taxes and expenses, $20,500, making a total of $429,500. The treasurer has received money to the amount of $228,600, or 53.7 per cent of the entire amount, enabling him, after meeting all current expenses and interest, to pay off the third and second mortgages on the property, and reduce the first mortgage from $225,000 to $204,000, and leaving him with about $3,000 on hand. In addition to this, there are several thousand dollars of conditional subscriptions, the larger portion of which, it is thought, will be ultimately collected.

Building Accident.—While workmen were engaged in tearing down an old building at Columbus, O., on Feb. 16, the second section of the floor gave way, carrying with it one of the side-walls of the structure. Two laborers, who were caught by the falling *débris*, received serious injuries.

A Curious Explosion.—One of the most inexplicable explosions took place recently, at the Pine Iron Works in Montgomery County, Penn., when a teamster tipped a cart-load of hot cinders into a snow-bank. This apparently innocent action produced an explosion which is described as "fearful." Houses a hundred yards away were violently shaken, and persons near by were burned and cut by the flying cinders. Even had the snow been chambered out by the hot mass, a hole would probably have been formed large enough for the rapidly generated steam to escape through without causing the explosion.

The Public Inspection of Elevators.—The fall of an elevator in a clothing-warehouse in Cincinnati, on Feb. 16, whereby five persons were very seriously injured, reminds us that it would be well that these conveniences of modern life should be subject to the periodic inspection of a properly qualified officer. Such inspection would probably have averted the mishap in question; for the fall was occasioned not so much by defect in the design or construction of the elevator,—although the safety-catch failed to work,—as by the gradual wear and tear of constant use; for examination showed that the suspending wire rope was worn beyond the limit which could support such a weight.

R. I. P.—It is said that since the attempted violation of Lincoln's tomb, the Mount Vernon mansion and the tomb of Washington have been connected by a burglar-alarm.

New Journals.—The many processes by which illustrations may be produced cheaply, and with a degree of artistic excellence which often is remarkable, have enabled publishers of existing trade and technical journals to materially enhance their practical value by a liberal use of explanatory cuts. They have encouraged also the growth of new technical journals. The most recent of these is the *Scientific News*, a semi-monthly of eight quarto pages, which promises to cover very much the same field that is already occupied by the *Scientific American*. Another, which will cover a smaller field, is the *American Machinist*, a monthly journal of sixteen quarto pages. Of its character, the editors say, "*Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers. We are not engaged in procuring patent-rights, or in selling machinery; nor have we any get scheme to advance, or lobby to ride.*" Another and more distinctively trade journal is the new weekly paper, the *Dry Goods Trade*. All these journals are published in New York.

Sewers and the Rate of Mortality.—In response to a resolution passed by the Chicago City Council, the Commissioner of Health has prepared a report relative to the prevalence of scarlet fever and small-pox at the locations of the greatest mortality. The report is interesting, if only to show the influence of sewerage on the city's health. The following table summarizes the statistics:—

Wards.	Scarlet Fever.		Small-pox.		Acres.	Population.	Feet of Sewerage.
	Cases Reported.	Deaths.	Cases Reported.	Deaths.			
1	21	4	....	....	476.55	14,840	68,050
2	40	9	1	....	394.72	16,354	55,070
3	30	6	....	....	488.41	15,223	62,000
4	56	10	1	....	1,070.40	21,988	98,000
5	267	70	12	4	2,879.51	81,648	69,000
6	147	79	18	2	4,242.10	81,208	17,000
7	170	54	1	....	1,625.69	31,393	101,770
8	154	47	....	....	649.27	31,216	95,530
9	52	12	....	....	256.28	14,264	66,370
10	62	17	9	....	293.57	12,695	84,580
11	66	16	....	....	678.19	17,711	86,200
12	80	20	4	1	2,401.18	19,829	80,080
13	50	27	....	....	1,629.60	16,850	58,650
14	140	55	53	21	3,276.89	47,812	98,416
15	108	33	1	....	1,109.06	24,078	89,730
16	67	15	12	1	534.00	20,630	69,040
17	114	24	2	....	388.79	19,109	92,870
18	45	10	....	....	961.00	16,648	102,760
	1,640	521	101	32			

The Royal Academy.—We are pleased to learn that Mr. Alfred Waterhouse, the architect of, among other important buildings, the Assize Courts, and the new Town Hall, both at Manchester, has been elected Associate of the Royal Academy.

The Manchester Town Hall.—Up to the end of August, 1877, the Manchester Town Hall had cost £775,882, or about $3,870,410.

Eliminating Phosphorus from Iron.—A process for eliminating phosphorus from molten cast-iron has been invented by a Sheffield (England) gentleman. It consists in the employment of chlorine, which, being injected into or brought in contact with the iron, effects a separation of the phosphorus from the iron. The chlorine is applied in a gaseous form, which is done before the iron has been subjected to the air—as, for example, in the Bessemer process, or in the ordinary puddling or other decarbonizing process.

Discovery of a Roman Amphitheatre.—An important discovery has lately been made in Vintimiglia, between Nice and Genoa. According to an old saying, the ancient Intemerium, the *urbs magna* of Strabo, stood upon the Plains of Nervia. The French Government has given to Professor Girolamo Rossi the insignificant sum of 600 lire with which to institute a search in this locality. At the very outset he has struck upon a magnificent amphitheatre, built entirely of cut stone from the neighboring quarries of Turbia. Its plan is an ellipse, the longer axis of which is 115 feet, the smaller about 100. In beauty and solidity it bears the characteristic marks of Roman civilization. The discovery has already attracted many visitors to the quiet little town.

The Porcelain Tower.—The celebrated Porcelain Tower, near Nanking, China, is described by a traveller, who says: "In the quiet evening we made our way out of the city by the south gate, through a well-constructed tunnel, and shortly stood upon an eminence over whose surface was a mass of *debris*, consisting of broken bricks, tiles, and plaster several feet thick. This was all—all that was left of that which, for its historic beauty, the ingenuity of its construction, and its great cost, took rank with the wonders of the world,—the famous Porcelain Tower. It must have been very beautiful in its perfection, if we accept the statements of its various historians, who differ so little in their accounts that one does for all. From them we learn its form was octagonal, nine stories high, tapering as it rose to the height of 261 feet from the ground; the circumference of the lower story being 120 feet. The body of the pagoda was of brick, but its face was composed of porcelain tiles of many colors. Each story formed a kind of saloon, through which ran the spiral staircase leading to the summit, and whose walls were covered with small gilded idols resting in niches, the entire apartment being richly painted and gilded. Each story was defined by a projecting cornice of green tiles, from whose points gilded bells were hung. The roof was overlaid with copper; and above it rose a mast thirty feet high, capped by a golden ball, and coiled about by an immense band of iron, appearing like rings from below. The base of this shaft was an iron ball formed of two halves, the outer surface of which is magnificently embossed. I say is, for one half rests where it fell, the only tangible thing in the mass of ruin. The other half, weighing twelve tons, being broken by the fall, was recast into a temple bell. Standing before the half which is left, we query, Who were they that fashioned this beautiful casting, worthy the hand of a master? Whose writing and inscription embellishes its face, unlike any Chinese workmanship? Whose skill was great enough A.D. 1430, to place a ball of iron thirty-six feet in circumference, weighing twenty-four tons, upon a pedestal 261 feet high? This ball was the receptacle for various treasures calculated to ward off evil influences, among which were 'night-shining jewels,' pearls, books, gold, silver, thousands of strings of 'cash,' satin, silk, and priceless medicines. The number of bells on the structure was 152, and the interiors was illuminated by several hundreds of lamps, while the exterior required 128 to light it. It took nineteen years to build it, and cost $3,312,078. Of all this, not one story rests on the other; lightning, fire, and war have laid their hands upon it, and it fell, its final destroyers being the Tieping rebels, about twenty years ago. It stood in the grounds of a large Buddhist monastery, which fell at the same a prey to the fanaticism and rapacity of the invaders. One work of art within the grounds escaped destruction,—a pure white tortoise, bearing upon its back a perpendicular tablet with an inscription. This, with one solitary priest, keeps watch and ward over the ruins of bygone glory."—*Exchange.*

Sewer Ventilation.—The New York *Sun* advocates ventilating sewers by iron tubes or shafts, about 16 inches in diameter, which shall be carried up some hundred or more feet into the air. In each of these shafts are to be placed eight four-feet burners. These with a fifty feet draught, estimating the rate of the upward current of air at 4 miles or 21,120 feet per hour, would exhaust 500,880 cubic feet in every twenty-four hours; and by a small number of these shafts costing about $700 each, the air in the sewers of a large city could be changed daily. In addition to this, the soil-pipes are not to be trapped, but are to be carried up above the roof and left open; the object being not to allow sewer-gas to escape in that way, but to allow fresh air to be drawn into the sewers by the action of the gas-jets in the shafts: the current of air will thus always be in the direction away from the house. The cost of such shafts for the city of New York would be about $50,000.

Strength of Iron at Different Temperatures.—G. Pisati and G. Saporito-Riess find that the strength of iron at different temperatures shows peculiar irregularities. The strength in a wire which is exposed to a dull-red heat diminishes, with increase of temperature, from 14° to 50°, then increases to 90°, diminishes rapidly to 120°, remains constant to 200°, sinks slowly to 235°; then comes a sudden increase, which is followed by a gradual diminution. The strength is greater at 300° than at 140°.—*Dingler's Journal.*

A Japanese Bell.—At the temple of Ularo, in Kioto, Japan, is to be seen the largest bell in the world, hanging in a tower on the hill, and is said to be very perfect in tone. By measurement it exceeds the great bells at Peking, China, and at Moscow, both of which are cracked. Where the bell was cast, and by whom, is lost in the shades of antiquity. Chinese and Sanscrit characters cover the entire surface of the bell, but no modern Japanese scholar or priest can translate them. This bell is twenty-four feet in height, and sixteen inches thick at the rim; and when the priests sound it (at eight o'clock every evening), its majestic booming is heard miles down the valley. None of the bells in Japan have "clappers," but are sounded by suspended levers of wood, used like a battering-ram, and striking the bell on the outside.

The Sutro Tunnel.—The Sutro Tunnel is 18,680 feet in length.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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THE appropriation for the Paris Exhibition once secured, and the commission organized, there seems to have been a commendable promptness in getting to work. Two government ships, the famous Constitution and the Supply, are announced as loaded and ready to sail for Havre with American contributions: they will probably be at sea before this paper reaches our subscribers. The narrowness of the space left for us in the exhibition building at this late day, and the quantity of things offered to fill it, have obliged Commissioner McCormick to build an annex, at the charge of the Congressional allowance. This will take a piece from the slender appropriation, and the increased cost of guarding it another; an additional example of how delay, as well as haste, makes waste. We already hear that the Government has found it necessary to detail two additional vessels,—the Wyoming and the Portsmouth,—and may be thankful for the interest that this indicates; but we suspect that a good deal may still be done to accommodate things to their places, by restraining the exuberance of those who exhibit bulky articles or collections. Most people will remember the fatiguing impression made upon visitors to the Centennial, especially in the Agricultural Hall, by enormous ranges of similar articles where two or three specimens would have sufficed, or by huge models where small ones would have been better. We read that a lumber-dealer of Philadelphia has constructed a great trophy out of forty-three different kinds of native woods. The trophy occupies eight by twelve feet of space, and we may hope that its merit of design and execution justifies its size; but that can scarcely be the case with a contribution which is expected from California. This is a pyramid twenty feet square and seventy high, gilded we presume, which is to represent the cubic volume of gold thus far taken from the mines in California. To it are to be added five hundred tons of various minerals as specimens,—the cargo of a ship, as ships used to be built not so very long ago. It may be assumed that this gigantic contribution, if it gets to the Exhibition, will find its way to the annex above mentioned. It is a pity that there is not somebody to remind the people of California that, even in Paris, exhibition-buildings are not made on the scale of the Rocky Mountains and Pacific farms, and that in an exhibition of industrial art, skill and not bulk is the desideratum. However, the seventy-foot pyramid is doubtless hollow; and if room is scant, the five hundred tons of minerals, after reserving sufficient specimens, may be safely stored under it, and perhaps still leave room for other things that it may be desirable to get out of the way.

MR. THOMAS BRASSEY, M.P., well known in England for his interest in questions of labor and for his writings upon them, has lately read a paper at the Royal Institute of British Architects, in which he gave a systematic account of the change in the wages and condition of workmen in the building-trades during a generation past. He finds that the average increase in wages since 1853, making allowance for the diminished hours of work, is 44 per cent; and the actual increase per day or hour in ten years from 1865 to 1875 ranged in the different trades from 17½ to 35 per cent, the least gain being that of the plumbers, and the greatest that of the common laborers, while the general rise in most of the trades was about twenty per cent. Up to 1853 the uniform rate of wages among the trades had been for a long time five shillings per day. Then set in a gradual rise accompanied by a reduction of hours, which led the masters in 1861 to introduce the system of payment by the hour, after which the rates of the different trades began to diverge. The reduction of hours had indeed begun somewhat earlier than the increase of wages; and between 1847 and 1877 the rate, which had amounted to thirty shillings per week for sixty hours work, grew to an average of 30*s.* 4½*d.* for fifty-two and a half hours work, which is equivalent to the advance mentioned above of 44 per cent. If the only change had been in the time and the wages, this might not have increased the cost of building in any thing like the same ratio; for, owing to the introduction of machinery and improved processes, the price of most building-materials has been kept down to a comparatively small rise, and brick has even diminished in cost by about twenty per cent, while in many respects the efficiency of labor on the materials has been increased,—as by hoisting-machines, mortar-mills, machines for dressing wood and stone, etc.,—but these improvements have been so far offset by the deterioration of the workmen and their slackness in working that the cost of building has increased from 20 to 30 per cent. As a striking example, Mr. Brassey quoted the cost of brickwork lately built by Messrs. Lucas for the North-Eastern Railway Company. The labor on this work would have cost at old rates 38 shillings per rod; adding 50 per cent for increase of wages, it would have been 57 shillings; and they contracted for it at 63 shillings. It actually cost more than five pounds per rod,—a loss to the contractors of 55 per cent on their estimate.

OF course these figures do not represent so much actual gain in the condition of the workmen, nor so much loss in that of the owners of buildings. A good part of it is to be set down to the depreciation of money; how much, it is not so easy to say among the continually shifting ratios of the prices of all kinds of articles. The cost of living has risen meanwhile very considerably, though hardly in the same degree; for the better class of workmen and their families, while they work less, live in greater comfort than before. The laborers, on the other hand, have not gained in equal proportion, though their wages have risen more; and the inference is, that they spend a greater proportion of their earnings in idle or mischievous ways. Mr. Brassey is inclined to think that the efforts of the trades-unions have had little effect in the rise of wages, which he considers to be a mere matter of supply and demand. As regards the broad general movement, extending over a generation, in which wages have kept pace with other things, he is probably right. But this is not the thing which is most troublesome. It is not a high or low scale of general prices, which only means the greater or less purchasing power of money, nor a steady movement in the price of one kind of goods or labor,—it is the uncertainty and fluctuation of prices, which upset the solid prosperity of a community. For this uncertainty and fluctuation in the building-trades and other industries, the unions, more than any thing else, are responsible. And the deterioration of the workmen, the levelling down of the accepted standard to the performance of the poorer artisan, the diminution of the quantity and quality of work performed in a given time, are mainly to be charged to them, we believe, for they are among their special aims. Mr. Brassey's remedy for the disorder into which labor has fallen, is a system of piece-work, or else of "set-work,"—a term with which we are not familiar, but which we understand to imply an agreement with a body of workmen to perform a given amount of work for a given price. We are inclined to believe that the hope of the immediate future lies in some such resource.

The Crispin strike in Massachusetts is practically ended; the men having yielded, first in Lynn and then in Beverly, to the principal demands of the masters. The board of arbitration of the Order, which assumed to control the field, refused to give up its position. But the persistent rejection of their interference by the masters proved too strong for them, and in one manufactory after another the men made their terms independently with their employers; generally going to work at the rates offered them, except where their places had been occupied by outsiders, who in most cases were retained. We find in the Boston *Advertiser* a list of twenty-five firms in Lynn who held their position through the strike. They employed in all 2,560 men, of whom 2,214 were thrown out of work, 2,100 of them being actual Crispins, or participants with them. The average wages, says the *Advertiser*, were $14.05 per week, which gives a weekly loss in wages to the strikers of $29,505, — or, since the average duration of the strikes was six weeks, in all $177,030. Six hundred and fifty new hands were taken on during the strike, and their places are lost to the old men. It is believed that the strength of the Crispins is broken by their failure in this quarrel: certainly one would think that their resources might be. The cost to the community of Lynn is of course much more than the mere loss of wages. The labor troubles and the depressions of business have reduced the weekly draft upon the banks for pay-rolls by about $45,000 below that of the same season last year. One manufacturing firm has been absolutely driven from the city, and four others have established branch factories elsewhere, to which their real business may be transferred if troubles recur.

The jury which has held its inquest on the Tariffville bridge disaster has been unable to agree: but eight of the twelve have united in a report that will win a substantial approval. They find no evidence that the bridge had been meddled with ("tampered" is the accepted word), nor that the train left the track. They dispose of one foolish apology by saying that "running two engines together when deemed necessary is not at all censurable," and by quoting the words of one witness, that "any bridge that would not carry two locomotives ought not to carry one." They think that if the bridge was originally what it ought to have been, to which they do not commit themselves, it had deteriorated through neglect, exposure, or overstraining, till it was dangerously defective, both timber and iron becoming unfit for their duty. They lay the responsibility on the directors of the Connecticut Western Railroad, and "present and declare that in the construction and management of railways it is time to take a new departure: that in their construction the eternal principles of nature should not be violated; and that in their management all, from the highest official to the lowest operative, should at all times be held to a strict accountability." We believe, after reading the published testimony brought out during the inquest, that all these declarations accord strictly with the facts and with reason, and we rejoice to see them made in this honorably uncompromising way, without fear or favor. We can only hope that the people of Connecticut may henceforth find some way of bringing home the responsibility of such disasters to those whose duty it is to prevent them. One could have wished that the jury had gone one step further, and added to their report that the bridge was not so constructed as in its best estate to be safe under the load that was put upon it. It is said that a bridge at Saybrook, not far off, is of substantially the same construction as the fallen one, and then it is only a matter of chance how long it stands. The foolhardiness of ordinary constructors is at least as perilous to the community as the recklessness of directors and superintendents. So long as we find engineers and other so-called experts reckoning on a factor of safety of two as the correct thing, or wondering why bridges and other structures do not bear all the strain which their materials endure under test, so long we may expect to see their constructions tumbling to pieces and killing our fellow-citizens, — unless we are ourselves so unfortunate as to be on or under them.

We have to add to our dismal record the fall of some unfinished houses in New York, by which two men were severely injured, and perhaps killed. A block of dwelling-houses, of brick with stone fronts, is building on Lexington Avenue, and had been carried up to the third floor. The morning after the violent rain-storm of last week, the workmen, on coming to their work, found that the earth under the rear wall of one of them had been washed away, and that the wall had fallen. The men had scarcely set to work, and one of them was still busy plumbing the walls of the adjoining house, when that too fell in a heap, burying him and another. No sufficient cause has yet been declared for the fall, but some opinion may be formed from the facts that these houses of brick with brown-stone fronts, of three stories and a basement, were to be built for eight thousand dollars each, and that according to a report of the specification the "girders" of the first floor were to be six by eight inches. The contractor, as is natural, insisted that the work and materials were the best, and could not imagine why they did not stand. He could only suppose that the freshly-laid masonry had been softened by the storm, which, as he agreed with the inspector of buildings, was responsible for the damage. Yet people who build houses in the winter must expect to have them rained on; and most persons would probably agree that a house which was liable to be beaten down by a heavy rain while it was building was not one that they would care to live in when it was finished.

The school-authorities of St. Louis have invented a new illustration of the dangers which beset children crowded into public schools. Some time ago the superintendent gave notice to the principal of the Devoll school to put his scholars under such discipline that they could all be got out of the building in two minutes or less. The principal accordingly arranged a sort of fire-alarm drill, as the chiefs of a fire police do, or the captains of Cunard steamers, and directed the children, whenever certain strokes of the gong were sounded, to hasten out of school at a half-run. The first day's rehearsal went off successfully enough; but the second time the alarm was given, the children made too much haste, and two of them were thrown down, trampled upon, and considerably hurt. A praiseworthy object seems here to have been sought in a most indiscreet manner. It is haste in getting out that leads to almost all the danger when crowded buildings take fire; and the thing to do by way of precaution would be not to teach the children to scramble out in a hurry, but to make them walk out as deliberately as possible. It is safe to say that when the exits are not cut off there is always time to clear a burning building, provided it is done leisurely; but none to clear away a fallen crowd. The people of St. Louis have, on the whole, got their lesson at a moderate cost to the children on whom they tried their experiment, at least in comparison with those of a city in Iowa, quoted by the *Globe-Democrat*, where an experimental alarm was sprung from without upon a school-full of children, with the result of killing two or three and maiming many. It may be hoped that something will be learned from it besides the necessity of discretion in their drills. Eight hundred children were lived in this one schoolhouse, three or four times as many as ought ever, in our judgment, to be allowed in one such building, notwithstanding the common habit in this respect, — unless, indeed, the building is so subdivided by fire-walls, and so provided with exits, as to be equivalent to two or to several buildings. As for getting so many out in a hurry, eight hundred equals the effective number of a regiment of soldiers, and we should be satisfied to know that a well-drilled regiment of that strength, distributed in the twelve rooms of a schoolhouse, had been got out in two minutes under a sudden alarm.

In our report of the last day's session of the Institute Convention, printed last week, Mr. Peabody is said to have read a paper on Colonial Architecture, prepared by Mr. McKim. This is an error of the stenographer. Mr. Peabody read a paper of his own, in place of one that was expected from Mr. McKim. It was printed in the *American Architect* of Oct. 20, 1877.

The Roman Forum. — The *Academy* says the Minister of Public Instruction has ordered a re-commencement of the excavations in the Forum Romanum. The whole area as far as the Arch of Titus is to be uncovered, and the front of the Forum connected with the remains of the Palace of the Cæsars.

THE FIRE QUESTION.

[Read at the Eleventh Annual Convention of the American Institute of Architects by T. M. Wight, M.A.I.A.]

In my first paper on the fire question, prepared for the Eighth Annual Convention, which was not read, but subsequently published in the *American Architect*,[1] the subject of prevention was outlined under two heads. The first, comprising the class of so-called fire-proof buildings, was not considered in detail. The second, relating to systems of what may be called for convenience "partial fire-proofing" and absolute exterior protection, was discussed at considerable length.

To resume the consideration of the first class, I will quote a few sentences in which it was referred to. After venturing the opinion that we were not likely ever to see a city entirely composed of fire-resisting structures, I said, —

"If, then, each new building cannot be a component part of a city wholly fire-proof, I submit to your candid judgment whether you do not take a fearful responsibility when you recommend the erection of a building wholly of incombustible, and consequently very expensive materials, which is to stand for years in the midst of others of a decidedly combustible character. Experience has shown that such a structure must be a veritable fortress against fire; and this is the case in few buildings I know of erected according to systems in use five years ago."

Also the following: —

"The most valuable buildings that have recently been erected in our large cities are entirely unprotected on the exterior, reliance being placed upon the *incombustible* nature of the materials in them. They are in no sense fire-proof when standing among combustible buildings."

First-class fire-proof buildings were described as those (I quote) "wherein the matter of cost is not an element to weigh against the use of any building-material or method of construction, so long as it is non-combustible, indestructible by time and the weather, and fire-resisting." . . . "In their construction the highest scientific and artistic attainments will always be brought in play. It will always be a matter of great concern how to make them secure against every contingency of fire, whether from inside or outside."

It is but a few years since it was the generally accepted opinion that an incombustible building was fire-proof. And by an incombustible building I do not mean one simply constructed with iron beams and the heretofore-employed materials for bridging the spaces between them, and otherwise finished like those previously constructed inside of wood; but one in which the materials throughout, except perhaps doors and floors — which convenience demands shall be of wood — cannot burn. But experience has demonstrated that such structures, though they will not *burn*, may still be *destroyed*. The new problem that confronts us therefore is, how to preserve the materials of construction from the effects of fire. It will not do to say that your house is fire-proof because there is nothing in it to burn. Houses are built for use. You cannot prevent people from putting combustibles into them. Perhaps they are built for offices; but who is to say how much furniture the tenants are to use? You cannot put up buildings for show, and then lay the blame upon the occupants if they are destroyed by fire. Take the case of office-buildings. Under severe scrutiny the accumulation of combustibles in them may be curtailed; but in the course of time other tenants come in, or the buildings are diverted to other uses. Consider the inflammable nature of a well-stocked and somewhat cramped architect's office. Look at the accumulation of cases and books in lawyers' offices, and see our public buildings stored with cases and documents often from floor to ceiling. A tenant may take two rooms, using only one of them for business. The other often becomes a storehouse; and so gradually that the owner is not likely to detect the illegitimate use made of it. Then the upper floors are often used for manufacturing which can only be carried on in such structures, such as engraving or lithographing, with their accumulations of combustible materials in places not easily reached by water. Many offices are filled with sample-cases from floor to ceiling, and drawers filled to repletion. I am not supposing that the fire originates in one of these rooms, where it might be quickly stamped out, as was the case lately in the Palmer House in Chicago. But suppose it starts among some boxes accumulated in a basement, perhaps only left there temporarily to be removed in the morning. In the stillness of the night the fire creeps up a stairway or an unprotected elevator, and communicates with a suite of such offices as I have enumerated above, with wooden doors and open transom-lights, and doors standing open between the rooms. Before succor comes a whole floor is in flames, and the incombustible yet unprotected materials of construction are in danger. Or, suppose a fire rages on the opposite side of a narrow street, and the wind sweeps the flames into the windows of a number of such rooms simultaneously; the same results will follow.

The sad experience of a few years has shown that the most treacherous and dangerous of these materials of construction is *iron*, the very mainstay and *shibboleth* of fire-proof constructions of ten years ago, and of some at the present time.

As regards floors, there is no instance in which the filling between iron beams has failed before the beams themselves; yet we have been discussing over and over again the various methods of doing this part of the work most effectually, when the vulnerable part has had no consideration. We have plastered the under sides of brick arches, and run elegant mouldings on the iron beams, which mouldings we have had as much as we could do to make stay in place at ordinary times. Some have called this fire-proofing; but a good fire will bring down these plaster mouldings in a few minutes, because they expand and crack, being heavier and thicker than the other plaster, and have adherence only at the edges. We have suspended ceilings beneath the beams and arches, putting an ordinary and cheap coat of plastering on an expensive structure of iron. This is much better. We have here the advantage of a confined air-space between the structure and ceiling. Still the plaster is thin; and if it absorbs enough heat to expand the lathing, by which process it bulges out in places, away goes the plaster, and the laths are of no account as protection to the beams. We have suspended sectional slabs of incombustible and non-conducting materials under the beams and arches at still greater expense, and with the addition of greater weights. This is better still; but it is a double process. What we want is a simple one, which will give a groundwork for the ceiling, and support for the floor, by one operation, and at the same time obviate the necessity of filling up dead space to get up to the proper floor level. Combined with this we want a positive protection for the beams, enveloping them on all sides.

Thus far I think only three methods of constructing really fire-proof floors have been employed. The first is where a flat arch of non-conducting and incombustible material has been sprung between the lower flanges of the beams, the lower surface of the arch being below the bottoms of the beams. When the blocks fit well, and the edges next to the beams slightly cover them, the space between opposite blocks has the form of a dove-tail, so that cement filled in for the protection of the beams can never be dislodged. This method is the one employed by the fire-proof building companies of New York and Baltimore, and by other constructors as well; the variations of different manufacturers being in the forms and materials of the blocks employed. With all these methods the ceilings are flat.

The second method is that employed by Mr. William Ward in the construction of his private residence at Portchester, N.Y. It has been fully described in the *American Architect and Building News*[1]; it is therefore unnecessary for me to describe it in detail. As briefly as possible I will say that it is a modification of the French system; but uses Portland cement and sand, instead of plaster and cinders. The beams are incased in a body of concrete, which is first allowed to harden. Ledges are left on the sides of this incasing concrete. At the level of these ledges is set a flat centring, on which is spread one inch of concrete. Then three-eighths inch iron rods are laid from beam to beam a few inches apart; then an inch of concrete; then iron rods crossing those previously laid; then one or two inches of concrete. The incased beams show below the ceiling, and the concrete in the spaces between them forms one homogeneous body with the concrete incasing the beams. Experiments have demonstrated that with this system of fire-proofing fully one-half of the iron usually employed in beams may be dispensed with, and that the formulas generally used for determining the depth and spacing of the beams do not apply in such cases. What formula can be used for them has not yet been determined.

The third method of floor-construction is that employed in the Mitchell Building at Milwaukee, and devised by Mr. Loring; the building being designed by Mr. Mix, architect. The beams are incased with porous terra-cotta, there being one block on each side; the two meeting at the under side of the beams. These are set with ganged mortar. They form skewbacks. Barrel-arches are not employed; but at intervals of very nearly two and one-half feet, solid segmental brick arches are sprung across from beam to beam, the same as would be employed over an opening in an eight-inch wall. This leaves a series of open squares. The brick arches are connected by slabs of hard terra-cotta of cellular form, two feet long, one foot wide, and two inches thick each. The ceiling shows the incased iron beams one way, the segment arches the opposite way, and the panels of hard terra-cotta in the interstices. The surfaces of all the parts are rough enough to receive plastering. This has the advantage of being the lightest construction yet employed when iron beams are used.

For girder protection the case is similar to that of a beam. The girder, however, is often exposed on the sides as well as the bottom, and needs more careful protection as it is more exposed. We find many buildings in which the girders are wholly unprotected. This is the case in the largest jewelry-house in New York. In most instances the girders are either incased with wooden furring and laths, plastered in the ordinary way, or with iron laths similarly plastered. These, as far as protection goes, are quite as imperfect as the same process applied to ceilings. I have been informed that in some buildings girders have been enclosed with flat slabs of non-conducting and incombustible material. I do not know of any in which they have been buried in a solid envelope of non-

[1] See *American Architect and Building News*, vol. i., pp. 195, 203, 211.

[1] See vol. ii., p. 203.

conducting and incombustible material, except the Mitchell Building at Milwaukee. For this porous terra-cotta blocks have been cast to nearly fit the beams forming the girder, the blocks having straight exterior lines. The slab forming the bottom is bedded up against the girders, and the side pieces hold it after the manner of a dove-tail. The side pieces have bearings on the bottom flanges of the beams forming the girder. The whole is held together in a solid mass by the ganged mortar in which the terra-cotta is set, which fills all the interstices between the girder and the porous body. Plastering is applied directly to the porous body. There is a wide range of materials which can thus be applied to the protection of girders, varying however in non-conducting properties and weight.

In the older government buildings, isolated supports such as pillars and columns were either of brick, stone, or marble. These were used indiscriminately, on the supposition that they were incombustible and consequently fire-proof. Stone and marble seem only to have been used in preference to brick where richness of effect and a slight decrease of dimensions was sought. It is needless for me to call your attention to the imperfections of stone, granite, or marble as materials to resist fire in the interior of a structure. Where the room can be spared and sufficient strength obtained, brick will ever remain one of the most efficient fire-resisting supports. It is weakened in this respect, however, by the insertion of stone, marble, or granite bands. Where such are necessary, plates of cast or wrought iron should be employed. They may be very thin, and the amount of heat absorbed by them can do no harm. Iron bands are useless to prevent the crushing of brick piers or arresting its progress, especially when the loads are central.

Thirty years ago cast-iron came into use for isolated supports, the first columns having been imported from Scotland. They may now be seen at the corner of John and Pearl Streets, New York. Strange to say, all the columns then imported were not used at that time, but twenty years after were employed in another building. The use of cast-iron for columns is now almost universal, and many in our profession have made their first concessions of their sense of architectural propriety to practical convenience in using them for fire-proof structures. It is not many years since the danger to be apprehended in the use of iron for columns, whether cast or wrought, became apparent. It seems to have been perceived in England before it was in this country. A cast-iron column expands considerably before it becomes sufficiently heated to be materially weakened. The expansion is very nearly one-twelfth of an inch to a foot, or one inch in twelve feet. It forces the superimposed load upward, and thus not only lifts the work, but is resisted by all the rigidity of the work; this brings a strain on it that it was not calculated to bear, and it breaks as soon as it is softened in the least. It would stand a greater heat with safety if the load was not thus increased. If water is thrown on it the nearest side contracts; it bends, and the load, bearing on a curved support, breaks it, no matter what the co-efficient of safety may be. It does not fly to pieces, as some suppose, on account of the action of water alone. It snaps off on account of the weight, even if moderately heated. If heated to the softening point, which is very nearly the melting point, it flattens and bends over. I have seen many of them with one end entirely melted off. It will thus be seen that it is not only necessary to prevent columns from melting, but to keep them from expanding. The expansion is a greater element of weakness in columns than in any other part of a building. England was first awakened to the necessity of protecting iron columns by the destruction of the Paplechnicon, a supposed fire-proof building, which contained many of them. The necessity for protecting them in fire-proof buildings of all classes became apparent to the writer on seeing the destruction of the Chicago Custom House in 1871, due alone to the weakness of the iron columns on the first story. I had occasion to give some account of the destruction of this building, in this very place, six years ago.

Dennet was the first to propose a method of protecting cylindrical cast-iron columns. He surrounded them with two and one-half inches of Portland cement, which was plastered around the columns after they had been wound with spirals of iron wire. This increased their diameters five inches, and made them quite bulky. He tried some interesting experiments with actual fire; placed thermometers inside, and suspended fine strips of lead in them, to show that they would not melt. A double iron column has been used in New York for some years. The space between the cylinders is filled with plaster Paris. An iron-contractor told me that they were liable to burst in frosty weather, and consequently they put in the plaster in a dry powdered state. In case of the destruction of the outer shell by fire, which is most likely, the dry plaster is liable to fall out, and the supporting column becomes exposed. These columns are heavy and expensive. The method of combining iron with a non-conducting and incombustible material, calculated to resist heat, and at the same time receive an incombustible covering having a superior exterior finish to that of iron, invented by my then partner and myself a few years since, was the result of our observations of the effects of fire on the old Chicago Custom House. This is too well known to require extended description in this paper. It has been employed in the Mitchell Building before mentioned. The various methods described are the only ones known to have been employed up to the present time for the protection of floors, girders, and columns.

Partitions, if required to be light and otherwise than of common brick, do not present the difficulties which surround the architect in considering the floor question. Many materials useless for floors may be good for partitions. Of those not generally known to the profession, but worthy of notice, may be mentioned that of James John of Chicago, and such as was employed by Mr. Ward in his house at Portchester. Mr. John strings heavy wires (about No. 10) from floor to ceiling four inches apart, and sets up boards one inch from the wire-work. He then throws ganged mortar against the boards until it is two inches thick, thus leaving the wires in the centre. He levels his work off, removes the boards, and thus gets a solid partition of two inches. Mr. Ward made similar partitions of the same thickness by setting up three-eighths inch iron rods, and filling in with Portland cement concrete in the same manner. Besides these materials porous terra-cotta bricks, as employed in the Mitchell Building, hollow bricks, or any of the manufactured building blocks containing hydraulic lime, make reliable partitions four inches or more in thickness, and not requiring any extraneous stiffening.

Roof-construction does not need consideration here, because the problem is the same as floor-construction. Iron truss work for roofs must receive as careful attention as girders or columns. It is well to remember that the trusses of the Patent Office roof were entirely made of iron.

With regard to the aspects of the fire question from the point of view of fine art, a new field for thought must be traversed. If we cannot reconcile these new methods to our preconceived ideas of artistic propriety, it seems to me that in the present exigency we would be recreant to the evident demands of necessity, were we to sacrifice the former or attempt any compromise with the latter. The present state of affairs only shows that the problem of fire-proof building is not yet fully solved in all its aspects. The student of art has a new problem before him. The reconciliation must come when we know more than we now do. It would be foreign to the purposes of the present discussion to make any suggestions bearing upon it. It concerns us now to be alive to the necessities of the moment; to avoid all methods of fire-proofing which have failed to stand tests whether experimental or drawn from experience; to avoid expending our clients' money on methods of building which only hold forth false promises to those who confide in us; to consider diligently the contingencies of danger which may arise in every case; and to carry on scientific investigation until the end demanded is accomplished. It will not do to say that the case is hopeless. The world will only laugh at us if we do. We may expect to hear such things from the unlearned, but opinions from such sources will not have the weight which attaches to the dicta of scientific investigators.

THE ILLUSTRATIONS.

THE ORIENT MUTUAL INSURANCE COMPANY'S BUILDING, NEW YORK, N.Y. MR. A. H. THORP, ARCHITECT.

This building, which is now nearly finished, occupies the upper half of the Jauncey Court estate on Wall Street; it is built of white marble. The other half of the lot is occupied by the building of the Queen's Insurance Company. (See *American Architect and Building News* for Sept. 29, 1877.)

THE TAYLOR MAUSOLEUM. MESSRS. LAING AND FEHMER, ARCHITECTS.

This mausoleum has recently been built at Graceland Cemetery near Chicago. The interior is large enough to contain ten coffins. The shelves are of blue marble, polished edge, with white Italian-marble tablets. The ceiling is groined, Philadelphia pressed brick being used for the vault, and blue dressed granite for the ribs, corbels, and centre bos. The interior walls are faced with polished marble of different colors. The floor is of English encaustic tile. The walls are built of brick, faced with Westerly granite, the main portion of the building being rock-faced, the plinth and quoins at the corners pointed with margin draft line around; the steps, window and door finish, cornice and roof, are patent hammer dressed. The shafts at the entrance are of red polished granite, the shafts in the louvre are of blue polished granite, the bases and capitals are of white Canaan marble. The doors and tracery of the tympanum are white Italian marble. The windows in the rear wall and tympanum are glazed with rich stained glass of appropriate design. The hardware is of solid bronze; but the gate is of wrought-iron. The entire cost of the mausoleum is $10,000.

THE HIGHLAND HOUSE, CINCINNATI, O. MR. G. W. RAPP, ARCHITECT.

The Highland House, which was built in the summer of 1876, is at the head of the Mount Adams and Eden Park Inclined Railway, and is a species of *casino* which is used for a restaurant, and for balls, banquets, etc. In the basement are the kitchen, 18 x 30

fuel, laundry, ice-cellars, bowling-alleys, etc. The plans show the arrangement of the other stories.

DESIGNS FOR A STAIRCASE. — COMPETITION NO. 1.

We have been much encouraged both at the number and quality of the designs which have been sent in for our first competition. We have received twenty-eight drawings, of which we propose to publish two pages of four each. In many cases the drawings are of so nearly equal merit that it is difficult to draw the line between them, and we cannot always be sure that those we select for publication are distinctly better than others which we omit for want of room. It may also happen in some cases, that designs which are excellent in idea, or even in performance, are unsuited for reproduction by reason of inexperience or other fault in drawing. Competitors can, by observing how their drawings appear when reproduced, draw their own conclusions as to what changes they should make in their style of drawing, in order to reach the most satisfactory results in our pages. We wish, however, to draw attention to defects that are common to almost all drawings that we receive, — crowding of lines and the want of perfect blackness in them. This blackness can always be best obtained by adding to the India-ink a little lamp-black or ivory-black.

We trust that those who have tried their hands at the first competition will continue as competitors in those which are to follow; for it should be borne in mind that the real good to the individual is not the winning of a prize nor the publication of his design, but rather the strengthening of his powers as a designer by the solution of a real problem, and the instruction he will receive in studying the solutions that others have reached in the same premises. We regret that several designs have been received too late to be admitted to the competition.

INTERIOR DECORATION.[1]

This book is worthy of a name not vulgarized by the use of the word *art* as an adjective. We protest that it is much too good to be christened with such a commonplace abuse of good language. It is by no means a mere perfunctory piece of literary task-work. The hand to which the work was committed is too well-trained and too skilful, and the taste too just, to be content with any thing less than a thorough piece of work, within the essential limits of dilettanteism. These limits, however, are large enough to give space to an excellent and symmetrical historical compendium of the subject, not elsewhere to be found in such convenient shape, to a sufficiently correct statement of the question of materials and their applications to the uses of decoration, and to a modest and sensible sketch of the hall, the dining-room, the boudoir, the bedroom, the library, and drawing-room, as they should appear to meet the requirements of modern life, according to the views of a lady of good taste, breeding, and sound common sense. From the point of view of the artist, Mrs. Spofford's elegant chapters only touch the surface of things, and give him no new thought or inspiration. In other words, they do not pretend to be professional, and do not reveal any of the technical mysteries of the art of decoration. They will serve to make the art better known to the public, however, they will awaken a new and intelligent interest in the subject, they may purify and enlighten popular taste, and make the work of the artist better appreciated. Such books, therefore, have a *raison d'être* from every point of view, and the artist may welcome them not as rivals but as allies in the warfare of art against vulgarity. Among these books of amateurs we do not hesitate to pronounce that of Mrs. Spofford *facile princeps*. We further venture to say that even in the matter of practical suggestion it is quite as sound and much more copious than the well-known work on "House Decoration" by the Misses Garrett of London, who are recognized as professional decorators, and who, so far as we know, are her only competitors among her own sex.

The chapters entitled the Gothic Style, the Renaissance, the Elizabethan, the Jacobean, the Louis Quatorze, Quinze, and Seize, the Pompeian, the First Empire, the Moorish, the Eastlake, the Queen Anne, and the Oriental styles, which occupy about one-third of the whole book, are certainly excellent historical summaries, and as such we commend them heartily to the reader. They are temperate, just, and comprehensive. Mr. John Hungerford Pollen, in his South Kensington Handbook on Furniture and Woodwork, goes over nearly the same ground and in nearly the same space. He gives more names, dates, and facts, and is perhaps more satisfactory to the special student; but Mrs. Spofford excels not only in the literary presentation of the subject, but in the manner of describing the essential characteristics of the styles of which she treats, and their significance as illustrations of history. In this last respect especially, we know not where to find a better piece of work. Her general statement of the historical proposition in the opening of the chapter on the Renaissance is an admirable answer to those who say that questions of furniture are unworthy of study, — unworthy of the attention of intelligent minds. It is brief, and worth quoting: —

"That it has taken the historic movements of the world to produce the trivial things that constitute our household furniture, — allowing that our furniture is trivial, and not as vital and necessary as temples and towers themselves, — seems, at first sight, a monstrous declaration. But it is nevertheless true that the convulsions of empires and the epochs that have shaped the fate of races have also shaped the articles of our daily use; and the events that have brought about our styles of architecture have unfailingly reacted on our furniture, and produced new styles there too."

The distinctions which she draws between the styles of Louis Quatorze, Louis Quinze, and Louis Seize, and her definition of the peculiar significance of these styles as illustrations and expressions of their respective epochs, are conceived with great intelligence, and set forth with a precision and clearness which leave little to be desired. As she intimates, it is impossible to look at the furniture of these three reigns, and not observe how license in the first became profligacy in the second, and how these qualities were restrained into decency in the third. There could scarcely be a better epitome of styles than such a statement. The picture of the contrast between the furniture of the reign of Louis Seize and that of his predecessors is an excellent example of the curious relationship existing between history and the minor arts.

As for the "Eastlake style," she is more discriminating and just than we might reasonably expect an amateur in art to be. The half of the civilized world which speaks English is so beset with moral ideas in art, — the altar, the credence-table, the reredos, the *prie-dieu*, have been so secularized for use in modern drawing-rooms, and principles have asserted themselves with such uncompromising vigor, that a lay sister might devoutly embrace the straight-backed creed, and eschew all worldly curves and profane blandishments in chairs, tables, and sideboards, without exposing herself to the charge of bigotry. But she is enabled to give to this singular and notable incident in the history of art its due place without overshadowing all other historical developments. She admits the wholesome influence of the sound principles which underlie its manifestations; she gives due credit to the honesty and durability of these manifestations, and to the ingenuity with which high principles have often been made not inconsistent with forms of beauty; but she will not relegate to the dusty oblivion of the garret all the comfort and luxury that are implied in the type of the Louis Quatorze arm-chair.

"If the Eastlake, so called, is not all in itself that might be wished, if it is here and there a little inconsistent with itself, it yet represents a movement seldom if ever before effected by a single person; and it has succeeded in inaugurating a new *régime*, which bears the same relation to the loose and wanton Quatorze and Quinze *régime*, that virtue bears to vice."

In like manner the Queen Anne and Georgian revival is philosophically discussed, its historical relationships justly defined, and its details set forth with much of the feeling and sentiment, and with not a little of the knowledge and research, which are the essential requisites of the modern artist. Indeed, many designers, in reading what she has to say on this point, may add materially to their stock of information. She quotes from the discussions that arose in the Royal Institute of British Architects, and in the meetings of the Architectural Association, on this new revival, and takes issue with some criticisms of the *Builder*. She attributes to the style not only elegance and refinement, but dignity. "It makes none of the pretension of the Gothic, and has none of the wearisome iteration of the Classic. It seems," she says, "exactly the furniture to surround unostentatious people of gentle manners and culture."

It will be seen that, according to our views, this is on the whole no ordinary book. We took it up with a doubt and distrust begot of a title which, by mere association perhaps, savors of pretence and vulgarity, and of a prejudice that a *littérateur* could scarcely contribute any thing of real value to a subject requiring so much of knowledge, experience, and technical training, to understand it aright; and we have laid it down, feeling that in this book we have a possession which we hesitate whether to place on the shelf devoted to elegant *belles-lettres*, or on that where it would have the graver and rarer companionship of those who have written well upon matters of art and history.

It is to be regretted, that although we can scarcely find fault with the quantity and quality of the wood-cuts, they serve simply to decorate the page, and have but little if any connection with the text. Indeed, the text does not allude to the prints more than two or three times; and the eye which seeks among them for an explanation, a confirmation, or illustration of a passage especially requiring such aid, is doomed either to disappointment or perplexity. These wood-cuts are selected from Viollet-le-Duc, Pullan, Talbert, Shaw, and other authorities, without further acknowledgment than a brief and inconspicuous general notice in the preface. Talbert's name, by the by, we do not see noticed at all. It would seem that at least the recognition of a foot-note had been earned by those whose works have been borrowed to decorate these pages. Let us hope that in the next edition, which we trust will soon be reached, this oversight will be remedied; and, better still, that enough especial illustrations may be introduced to enable the unprofessional reader to have something more trustworthy than his own imagination to depend upon, especially in matters requiring such delicate discrimination as the distinctions between the styles of adjacent reigns.

[1] Art Decoration applied to Furniture. By Harriet Prescott Spofford. With Illustrations. New York: Harper & Brothers, Publishers, Franklin Square. 1878.

BOOK NOTICES.

HOUSE-PAINTER'S HAND-BOOK.[1]

If other writers of hand-books would give as clear and concise information upon the subjects they treat of, as Mr. Stevens has given in the little treatise before us, the task of the student and practitioner would be materially lightened. Apprentices, painters, and architectural students should read it with attention; and even older architects can learn much from its pages, and will for the first time, perhaps, appreciate the true meaning of certain stipulations and directions that they are in the habit of mechanically incorporating in their painter's specifications. The book treats of materials, mixing, qualities and properties of paints and oils, dry wood, wet wood, rain and dew, repainting, roofs, old paint, etc. The author has his peculiarities of style and opinion, but as a rule sticks to the practical treatment of his materials; and although he does say, "Blinds should vary in color according to the style of architecture; for a Gothic house, they ought to be of a shade between the trimming and the body, and may be improved by having the panels light and stiles dark," he usually leaves aside the æsthetic consideration of his handicraft.

ORNAMENTAL ALPHABETS.[2]

The first impression that one gets on looking through this quarto volume of eighty lithographic plates, printed on heavy cream-laid paper, is that the draughtsman who shall seek aid from its pages will inevitably add to the exasperation that almost always arises in the lay mind when compelled to decipher the title of an architectural drawing. There are, however, some few alphabets or portions of alphabets that may, with proper caution, be used by the draughtsman in every-day work. Church Text, Old English, and German Text are all the regularly acknowledged alphabets that are given. Besides these there are two or three alphabets from old manuscripts, which give the book a certain antiquarian flavor, slight though it be.

DER ROHRLEGER.

A new periodical appears in Berlin, bearing the title *Der Rohrleger*, that is to say, The Pipe-layer; it has for a specialty the interests of those who supply buildings with light and warmth, water and air. This branch of architectural engineering, which has made so rapid an advance in the last two decades, is of universal bearing, and of particular importance to public hygiene. It is true, almost all technical papers give more or less attention to the theme; but having wider or different purposes in view, none of them have treated of the subject otherwise than as wholly subsidiary to these, until the new *Plumber and Sanitary Engineer* came to occupy the ground among us. The appearance of the *Rohrleger*, as a specialist, is a welcome accession to professional literature, and promises a record of every improvement in the methods of warming and ventilating our structures and of providing them with water and gas.

THE ART WORKER.

We have to record the appearance of a new fellow journal, the *Art Worker*,[3] a monthly magazine of designs for decoration. Its purpose is sufficiently shown in the following extract from its prospectus:—

"The scope and purposes of the *Art Worker* are fairly indicated by its title; viz., to supply good design of the later styles, in response to the growing demand created by the increasing public interest in all branches of art-industry. Illustrations of examples of decoration, ornament, and furniture will constitute its principal feature; though, owing to the wide field to be covered, many other subjects will necessarily receive treatment in its pages. The selections will be made with a constant view to technical and practical utility, and no effort will be spared to secure and maintain a uniform standard of excellence in the material."

It is to be published in monthly numbers, of which two have been sent to us, containing six and eight quarto plates on tinted paper, lithographed from pen-drawings and very fairly executed. They include a number of spirited designs for furniture, glass, and painted decoration,—most of them well drawn, some not so good,—of a kind likely to be useful to people who are looking for suggestions, and representing very well the principal styles of work in vogue among us. Three clever figure designs from Mr. Charles Booth, glass-stainer, lead off the first number, and prints selected from the designs of Mr. E. W. Godwin and Mr. Hulme furnish no larger amount of foreign matter than may naturally be looked for in a new serial. It is a magazine of plates only, containing no letterpress.

Durable Paint for Out-door Work.—Grind powdered charcoal in linseed oil, with sufficient litharge as a dryer. Thin for use with boiled linseed oil.

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[1] The Art of House-Painting; being a Clear and Comprehensive Record of the Observations and Experiences, during many years, of a practical worker in the art, and designed to instruct and assist in the every-day work of painters and others. By John Stevens. Published by John Wiley & Sons, New York, 1877. Price $1.75.

[2] Woodward's Ornamental and Fancy Alphabets, Monograms, and Titles. Geo. E. Woodward, New York, 1877.

[3] The Art Worker, a Journal of Design. Published monthly by J. O'Kane, 31 Park Row, New York. Nos. 1 and 2. Price one dollar each.

THE AMERICAN INSTITUTE OF ARCHITECTS.

CINCINNATI CHAPTER.

The Cincinnati Chapter, which has been dormant for some months past, has at last roused itself to the realizing sense that it may still be of some use in the community; at least, it seems as though a decided effort was to be made to keep it in existence; and to this end an election of officers was held on the 19th ult., to serve during the ensuing year, with the following result:—

President, James W. McLaughlin; Vice-President, Edwin Anderson; Treasurer, George W. Rapp; Secretary, Charles Crapsey. After this business was accomplished, a discussion was had as to the letting of contracts separately for the erection of buildings. Mr. Nash said that he had always advocated this mode of contracting, and had carried it into execution whenever possible. It worked better results to the owner; it was better for the principal contractor, so called; it was better for the sub-contractor; it was better for the architect. It compelled the architect to be very careful in the preparation of his specifications, in order to avoid any conflict of interests among the several contractors; to define clearly and without question what each must do, and how he must do it. After the contracts were let, however, the architect had an easier task in dealing directly with the head of each department, rather than at second-handed, or through the principal. Mr. Nash gave several personal experiences to support the ground he held. He would urge the matter upon the attention of his fellow architects, and hoped they would whenever occasion offered carry this practice into execution. Other members took similar grounds with Mr. Nash, the matter being thoroughly canvassed in the discussion which ensued.

PAINTING AND SCULPTURE AT THE CENTENNIAL EXHIBITION.—IV.

[The report of Mr. John F. Weir in behalf of the Judges of Group XXVII., embracing Plastic and Graphic Art.]

SPAIN.

A marked feature of the exhibit of Spain was the prominence accorded historical subjects. The Spanish school of to-day is not surpassed in technical excellence nor in the profounder aims of art; but as many of their strongest painters have pursued their studies in Paris, where their works are to be seen rather than in their own country, these have been more popularly classed with the French school. Zamacois, Fortuny, Madrazo, Agrassot, Ruiperez, Vallés, Gisbert, Vera, Escosura, and others, have made Spanish art favorably and widely known. The first united with extraordinary technical skill a profound and subtile meaning in his art. He was perhaps the most accomplished and piercing satirist of the time.

The Spanish collection at Philadelphia contained several representative works of great interest. A very large picture of "The Translation of St. Francis of Assisi," by R. Mercadé, was well worthy of study. The subject is treated with great purity of feeling, and indeed solemnity. The expression of the heads is very fine, and the composition simple and impressive. The picture is cold and monotonous in color, but in the sincerity of its aim it is admirable. "The Insanity of Donna Juana de Castilla," by L. Vallés, is also a work of great power; and "The Landing of the Puritans in America," by A. Gisbert, is serious and thoughtful; the figures have great dignity and simplicity of character. These pictures were loaned by the Museum of Fine Arts at Madrid.

"The Two Friends," by J. Agrassot; "The Burial of San Lorenzo, at Rome," by A. Vera; and "Sacristy in the Cathedral of Avila," by P. P. Gonzalvo, are also conspicuously worthy of commendation.

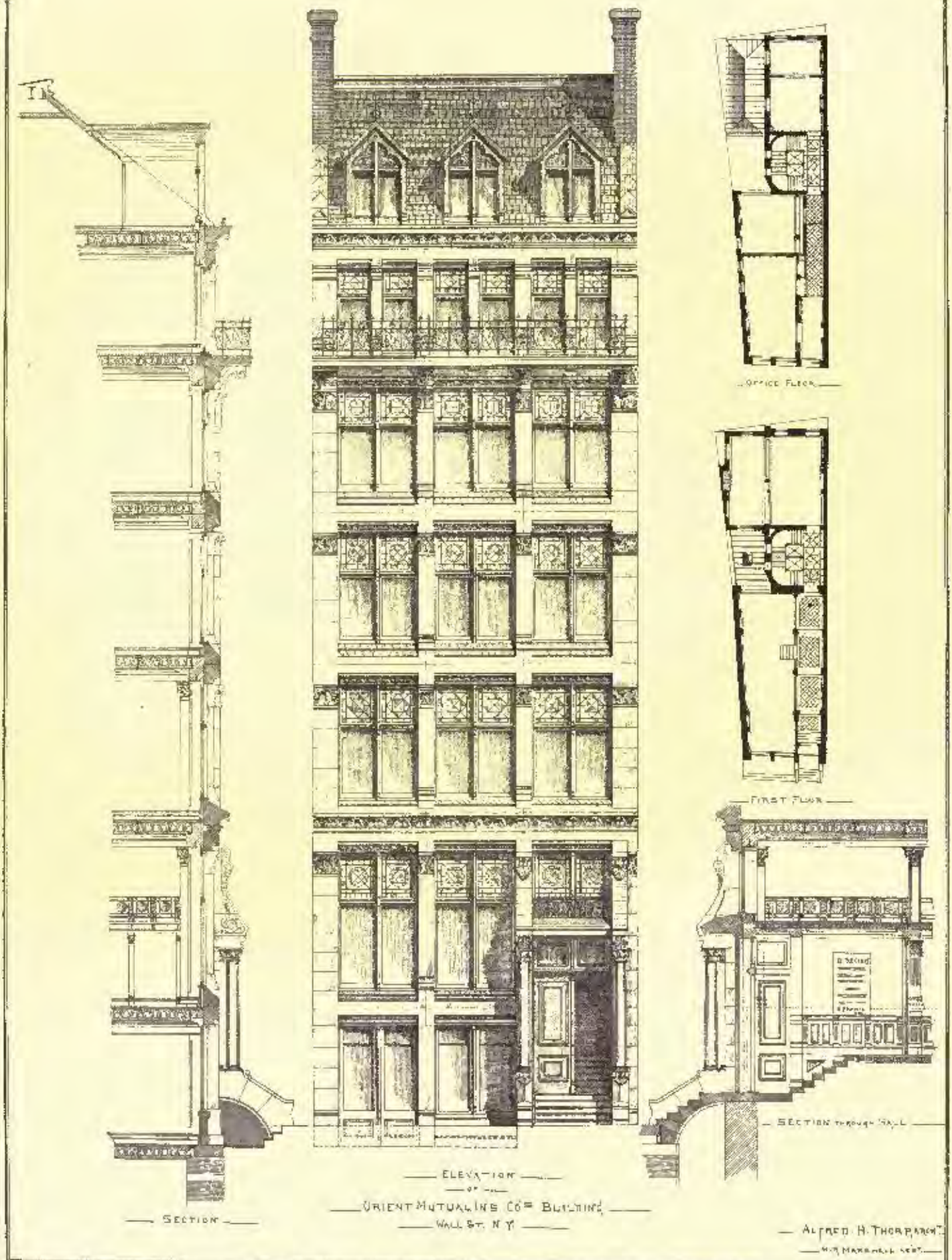
In landscape the Spanish exhibit contained little that evinced marked sympathy with this branch of art; and in sculpture the only examples worthy of mention were "The Wounded Bull-Fighter," by R. Nobas, and "Dante" (in bronze), by G. Sufol.

The impression gathered from the large historical works mentioned above was a very favorable one, and in this style of art the Spanish exhibit was especially admirable.

ITALY.

The Italian exhibit in painting did not do justice to the reputation which this school now enjoys through the widely-known merits of certain Roman artists, whose works we here looked for in vain.

Italian painting has recently acquired new life and vigor, partly through the influence of the French school, but mainly by a very praiseworthy return to the serious study of nature, in lieu of the conventional adherence to formal traditions that had long been unfavorable to its progress. Within the past few years it has made an extraordinary advance, and acquired thorough technical methods peculiar to itself, as well as great brilliancy of coloring. But the true excellence of this school was not represented at Philadelphia. The most noteworthy pictures in the collection were the "Evocation of Souls, from 'Robert le Diable,'" by R. Fontana; "The Interior of St. Mark's," by Luigi Bisi; "Interior of the Choir of the Cathedral of Parma," by S. Marchesi; "The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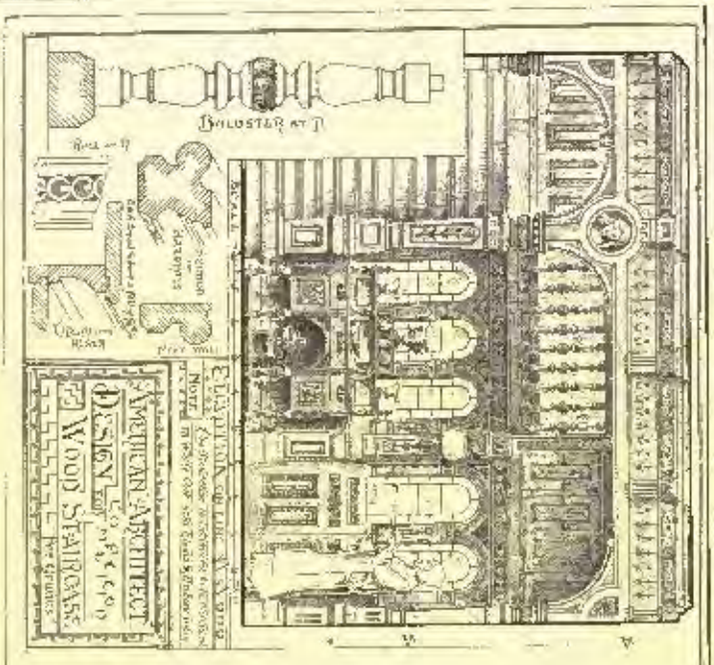
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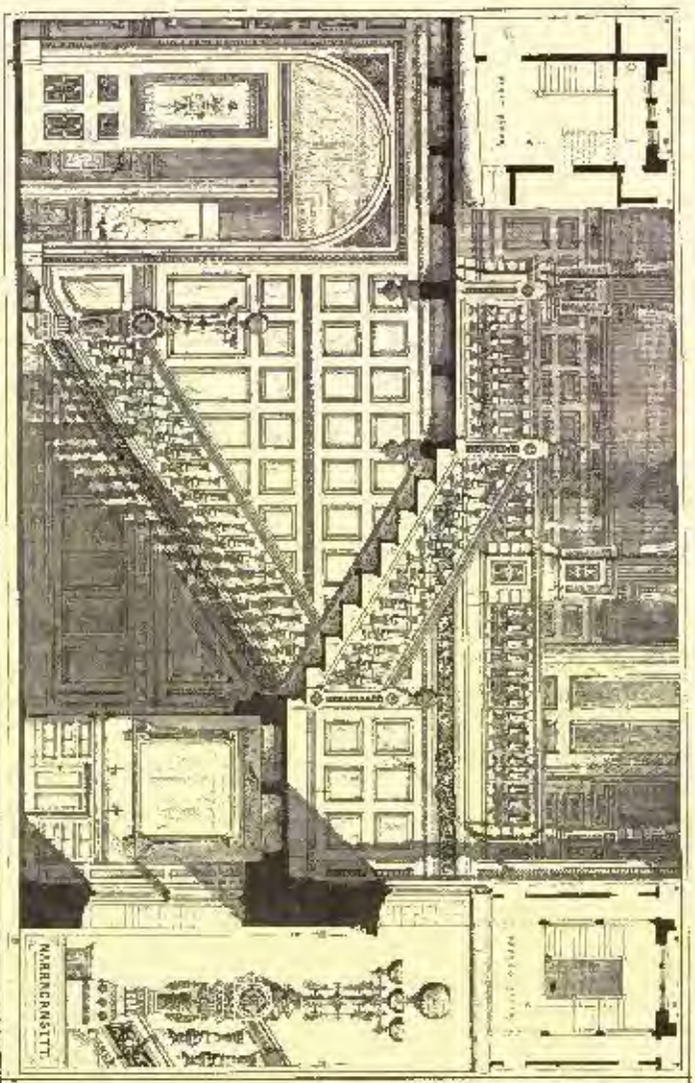
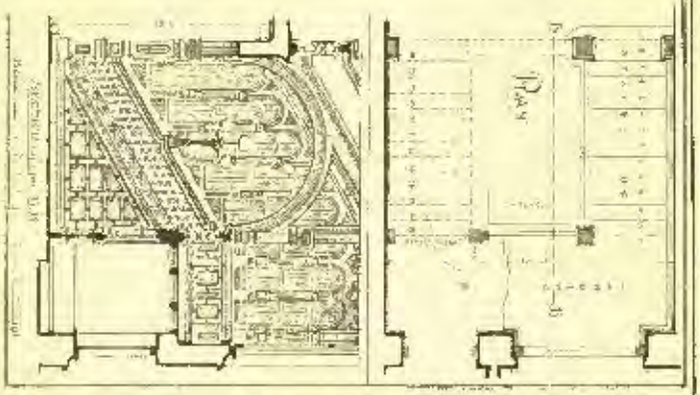
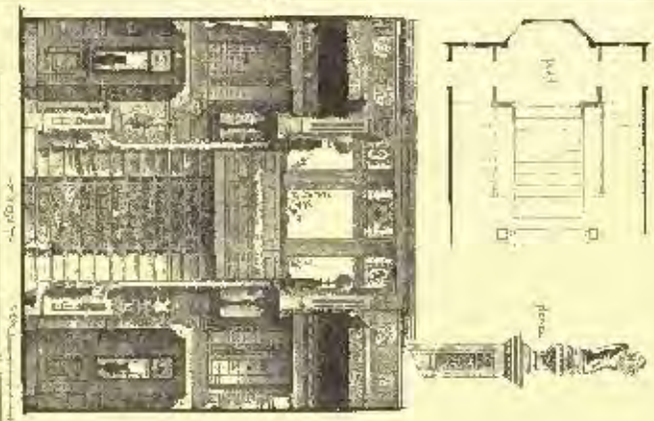
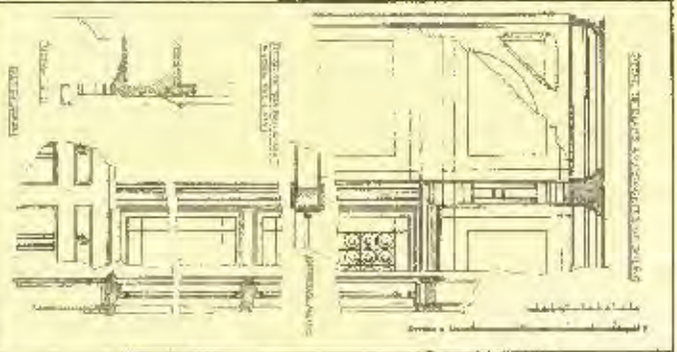
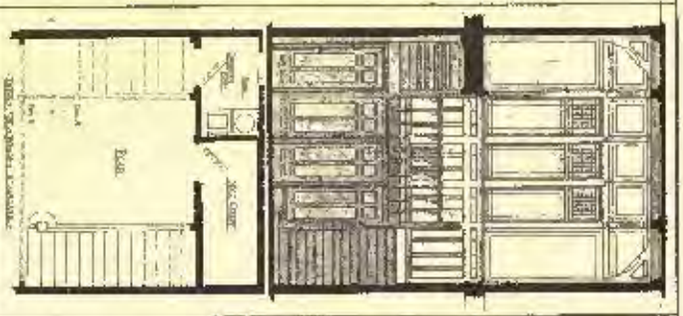
WOOD STAIRCASE

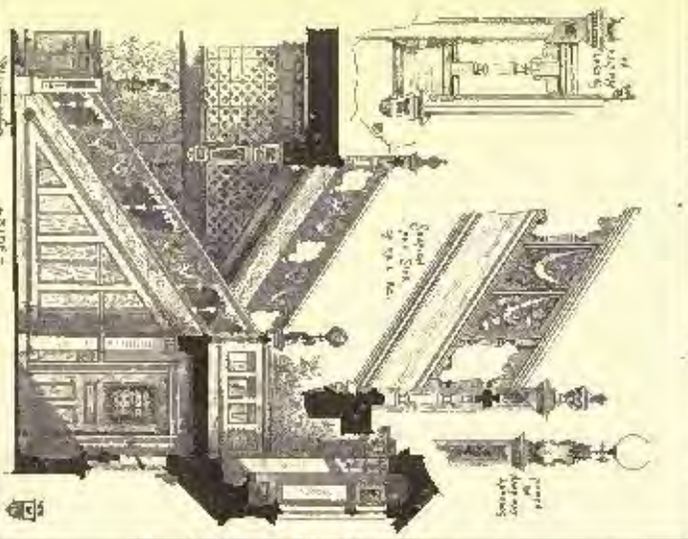


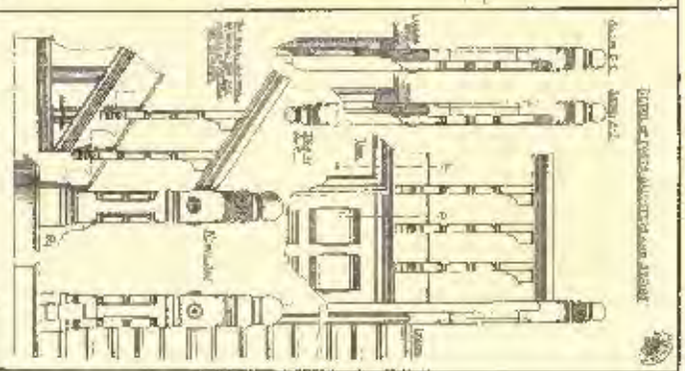


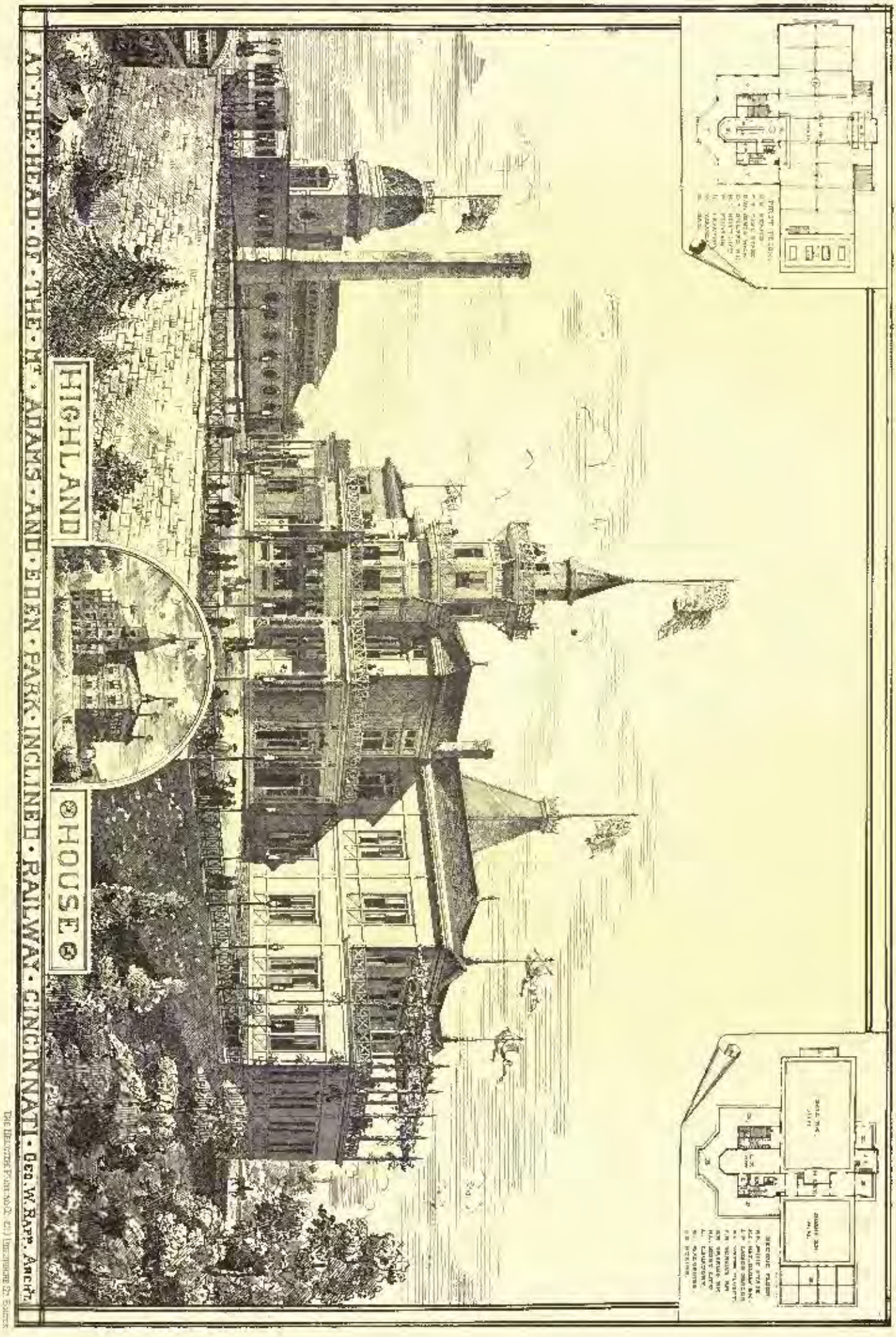








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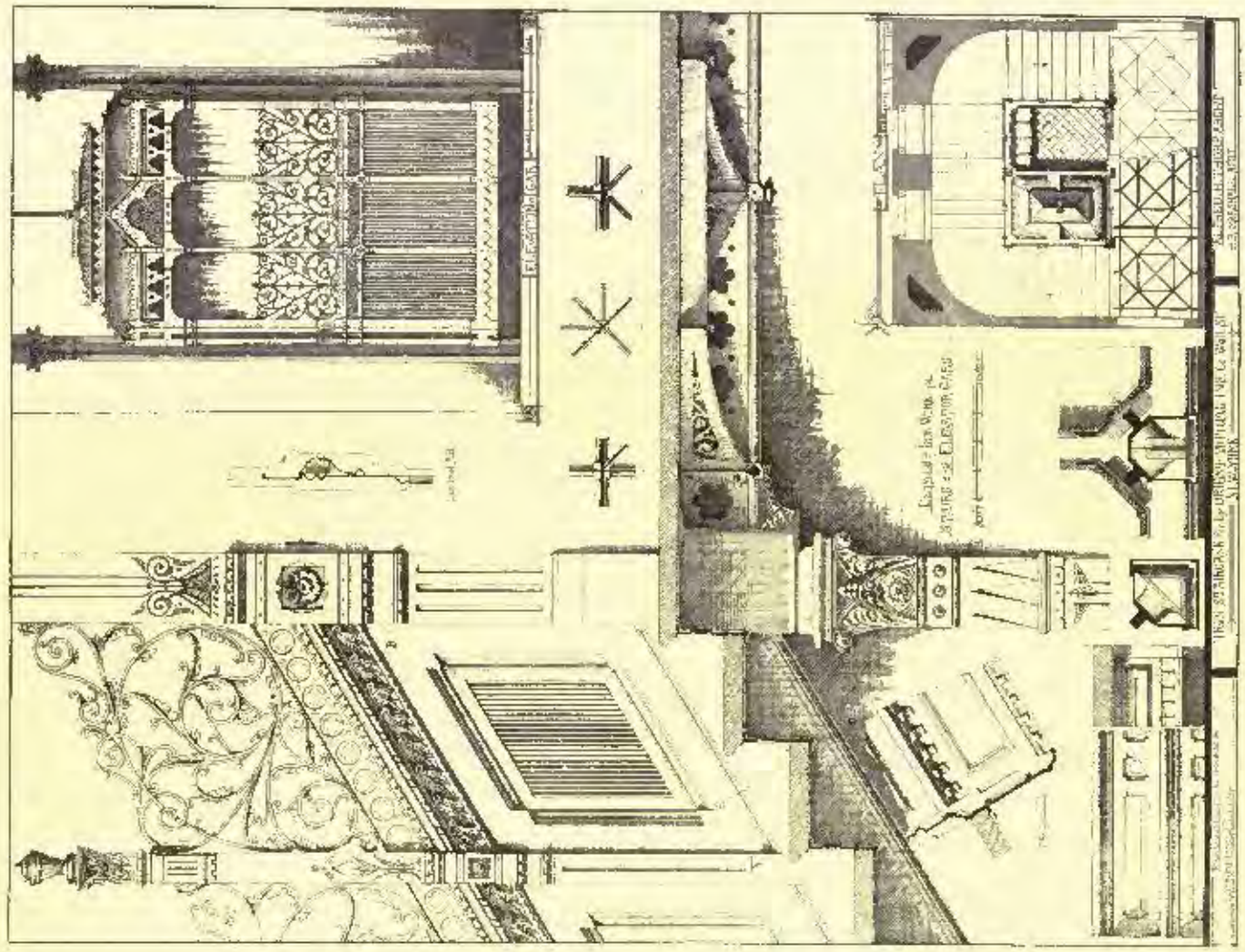
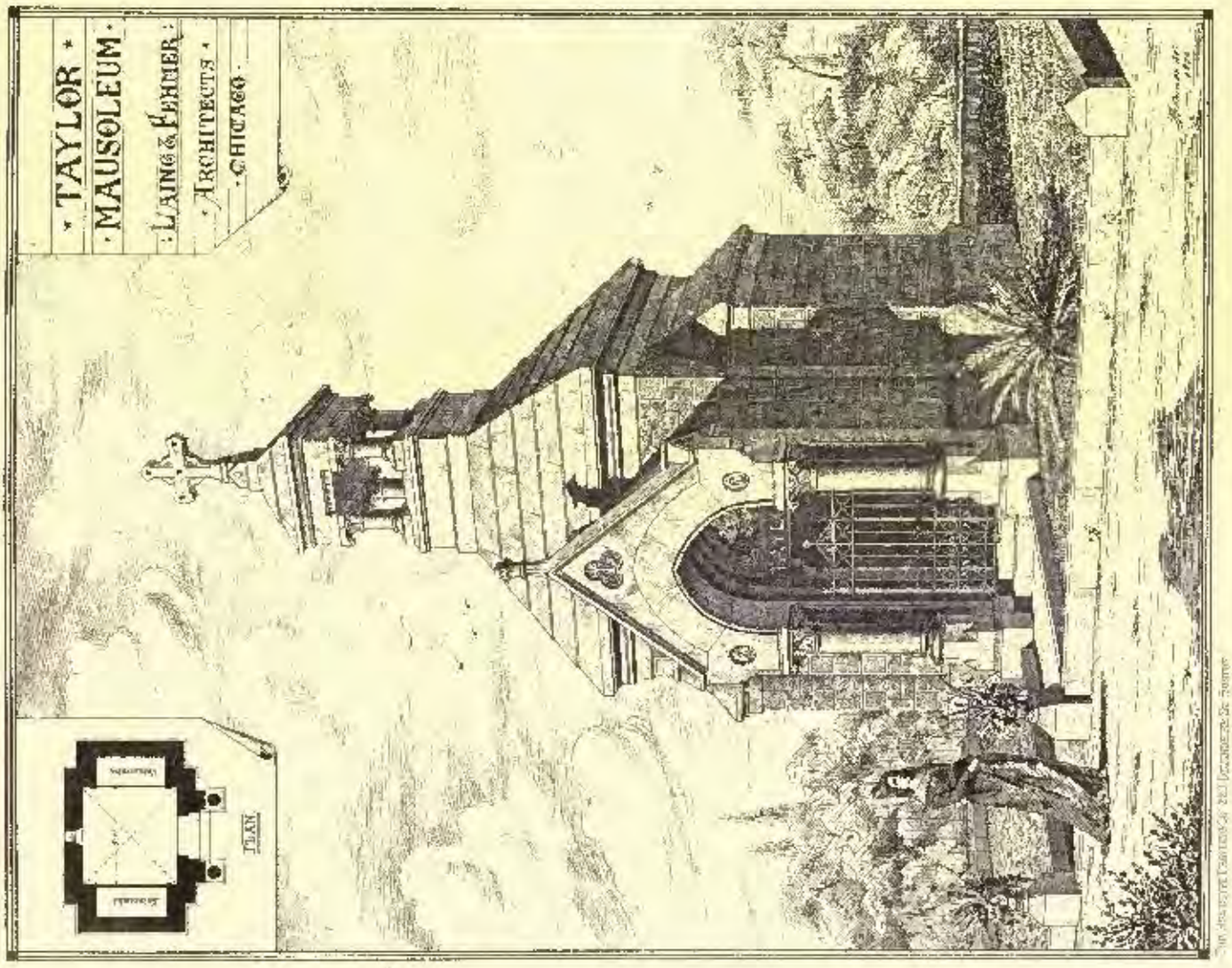
HOUSE
AT THE HEAD OF THE Mt. ADAMS AND EDEN PARK INCLINED RAILWAY CINCINNATI
GEO. W. RAPP, ARCH.

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ARCHITECTS
CHICAGO
PLAN

Escort," by G. Fattori; "Preparation for a Feast at Pompeii," by A. Sciloni; "A Grandmother's Admonition," by M. Cammarano; and two portraits by C. Maccari, — the latter being specially commendable. It is to be regretted that a more adequate representation of the merits of this school was not given.

In sculpture the Italian exhibit was very large, abounding in what may be termed *genre* sculpture, — in subjects of a domestic and familiar character that are better suited for pictorial representation than for plastic art. The impression made by these works was not a favorable one. The display of remarkable subtlety in the manipulation of material, in the dexterous undercutting and intricate chiselling, which rendered many of the sculptures curiosities rather than works of art, gave evidence of great skill in workmanship; but there was little that was essentially and vitally sculpturesque, and the collection, on the whole, was frivolous and unimpressive. There were, however, some works that bore evidence of a more genuine artistic aim, and among these may be mentioned "Modesty" and "Hope," by A. Botinelli; "Love is Blind," by Donato Barcaglia; "Timidity," by L. Torelli; "Youth of Michael Angelo," by E. Zocchi; "The Flower," by C. Pietro; "The White Rose," and "The Orphan," by P. Guarnerio; "Dreams of Youth," by G. Argenti; "Boy and Swan," by R. Perluzzi; and "Love's Nest," by R. Perida.

The wood-carvings of Luigi Frullini were worthy of admiration, exhibiting great beauty of design and very subtile skill in execution.

SWEDEN.

The exhibit of Sweden in painting bore evidence of very decided merit. French and North German influences are plainly recognizable, and it is difficult to trace a distinctive national character in their art; but, on the whole, there is proof of sound discipline and true artistic aims. A most admirable portrait by Count von Rosen was not surpassed by any thing of the kind in the Exhibition. It is painted with rare skill and feeling, fine in color, and well drawn. An "Odaliske," by Hugo Salmson; "Maid with an Open Letter," by G. Saloman; and "Market Day in Düsseldorf," by A. Jornberg, were the most noteworthy *genre* pictures of the collection; and in landscape, "Birch Forest," by E. Bergh; "Fishing Harbor," by Baron Hermelin; "Beech Forest," by A. Kallenberg; "Coast Scenery," by A. Nordgren; "Moonlight Landscape," by H. A. Wahlberg; and "Summer Evening," by P. Ekstrom, are worthy of special mention.

In water-color painting the most favorable examples were by Miss Anna Gardell.

NORWAY.

The Norwegian exhibit in painting resembled that of Sweden in character. The best examples of the figure bore evidence of foreign training and influence, and, while they exhibited decided merit, there was little that was distinctively national. In landscape, however, this is less marked.

The most important picture of the collection was "Ruth and Boaz," by Otto Sinding. This picture is a production of mature art, admirable in sentiment, in breadth and freedom of execution, and fine in color. The figures are thoroughly well drawn, and the landscape skilfully rendered. "A Fresh Breeze," by H. Gude; "Birch Forest," by S. Jacobson; and "A Summer Morning in the Birch Forest," by J. M. Grimelund, are also commendable.

RUSSIA.

There was very little in the Russian exhibit in painting of a character to warrant favorable criticism. The pictures displayed but little technical skill, and were generally dry and mannered. The most pleasing examples were "The Sunday Tea-party," by Alexis Knorzoochin; "Ice-drift on the Neva," by A. Bogolinboff; and the landscapes of J. T. Aivazowsky.

SOME OF THE ADVANTAGES OF THE METRIC SYSTEM TO ARCHITECTS AND BUILDERS.

TO THE EDITOR OF THE AMERICAN ARCHITECT AND BUILDING NEWS.

Sir, — A client one day wrote upon my blackboard these figures: "21 cu. ft. 1296 cu. in.;" asking what well-known measure they signified, and if they were the correct expression of the measure they pretended to designate.

If I found myself vanquished, Mr. Editor, after wrestling for a time with this conundrum, ought I necessarily to feel mortified thereat, and could my client justly have argued that such ignorance of ordinary weights and measures unfitted me for the practice of my profession? If, after that, my client put his question in another form by substituting for his figures the following diagram, ought I to have felt mortified when, though recognizing the measure and knowing its value in cubic feet, I could not certify to the correctness of its proportions?

For my own satisfaction I questioned a number of architects and builders, with the following result: —

The first builder was a Philadelphian. He gave the value of the perch as 22 cubic feet.[1] The next was from Providence. Though accustomed to reckon his stone-work in cords and cord feet, he sometimes came across the perch, and therefore knew its value to be 24 cubic feet. Some masons he said, however, used the cubic yard. Another, from Boston, put it at 24¾ cubic feet,

which is generally accepted as correct. Still another, who had done work in various States, made it a round 25 cubic feet for convenience, he said, of calculation; but in cases where it was considered important that the value of the perch should be understood by both parties to the contract, he generally specified at the outset the number of feet it was to contain.

As for the figures "21 cu. ft. 1296 cu. in.," none of the builders recognized them. I was therefore satisfied that they had it in their power to give the perch almost any value best calculated to suit their convenience without liability to conviction for fraud. All these builders, by the way, objected to the metric system on the ground that it would necessitate their learning their tables all over again. As for the architects, I found that to convey the idea of exact magnitude, the expression, "as big as a piece of chalk," or "as a good-sized fish," would be more useful; and if my client had drawn the diagram of his perch as shown, I believe he would have hit upon a more unvarying standard of weight and measure than he found in our unfortunate *load* perch.

Such, then, being the condition of things with regard to the perch, I resolved to make a test with some of the weights and measures in our tables still more familiar and more generally used, lest any one should object that I had taken the hardest I could find. I took the acre, the ounce, and the quart, and asked about them these very natural and practical questions: —

What is the length of one side of a square acre?

How do the ounce and pound Troy compare in value with the ounce and pound avoirdupois?

How do the milk, beer, and wine quarts compare with each other in value?

I also asked what the following measures were, and what *relation* they bore to each other: fierce, kilderkin, quarter, quartern, ton, and tun.

Up to this day I have been unable to find a single individual who could answer correctly any one of the above questions; and I ask you, Mr. Editor, if I am not safe in saying that there is not a man living in the United States who could give an exact answer to all four questions, simple as they appear, without referring to books? It is enough to learn that the ounce Troy is greater than the ounce avoirdupois by $\frac{1}{14.5}$, while the pound Troy is less than the pound avoirdupois by $\frac{2}{17}$, and that the relation between the wine tun and the ton avoirdupois is expressed by the convenient fraction $\frac{22}{35}\frac{4}{0}\frac{2}{0}\frac{1}{0}\frac{1}{0}\frac{1}{0}$ (*about*), to see that I am altogether likely to be safe in my assertion.

In the earliest stages of civilization and among savages, commerce is generally conducted in the form of barter; or, if some conventional standard of weight and measure is used, it has at least, in general, the advantage of simplicity, and a name indicative of its approximate value. With our worse than barbarous conglomeration of standards, where the name has been twisted and misapplied until it no longer has any relation to the substance, — a hundred signifying a hundred and twelve; twenty-eight, twenty-five; and a dozen, sixteen, — or where the same name refers to different things, and where the whole is no longer equal to the sum of its parts, the opportunities for fraud and embarrassment in all business transactions, and the waste of time and money in all the various works of life, become so serious as to rank among the most formidable obstacles to the advance of our civilization.

The only remedy I see for this evil is the universal adoption of the metric system; a system according to which the weight and dimensions of every material thing, whether solid, liquid, or gaseous, whether on land or on water, whether in the earth or in the heavens, and whether determined by the scale, plummet, balance, barometer, or thermometer, are ascertained by a method absolutely uniform, entirely simple, and equally suitable to the use of all mankind, resting upon a single invariable standard of linear measure, with multiples and submultiples, like those of our monetary system, exclusively decimal, with appropriate names, similar in all languages; and itself secure against the possibility of change or loss through carelessness or accident or design, by being constructed on scientific principles, and copied for distribution among the different nations of the world.

The following problem, solved first by the English and then by

[1] Solid contents of a wall *sixteen* inches thick (taking off the wall a piece which is a rod, pole, or perch in length, and one foot high).

the metric system, shows how much may be saved by the latter in our calculations.

PROBLEM.

What is the solid contents, in cubic yards, feet, and inches, or metres and centimetres, of the brickwork in the walls of a reservoir 19′ 8″ (6 m.) square, 22′ 0″ (6.7 m.) high (inside measure), and averaging 4′ 8″ (about 1.4 m.) thick; and what is the exact weight of these walls on the foundations?

Also, what is the amount and weight of the water which the reservoir would contain?

Given weight of 1 cubic inch of water = 252.7453 grains.
" specific gravity of brickwork = 1.6

And it being known that 1 cubic centimetre of water weighs 1 gram, or that 1 cubic metre of water weighs 1 metric ton, or 1000 kilograms.

In the first solution 876 figures are used, and only an approximately accurate result is possible.

In the second solution only 74 figures are used to obtain an absolutely accurate result.

In the second the answers may be read differently: thus, answer 1 may be read, 277 cu. m. 648 cu. decimetres; answer 2 may be read, 444 tons 236 kilograms 800 grams, without changing the figures, but merely removing the decimal points.

In the first solution there are *twenty-five* distinct mathematical operations requiring the use of the pencil, or which cannot easily be performed in the head alone.

In the second only *two*.

J. P. Putnam.

[The example prepared by our contributor proved only too convincing, inasmuch as to print his computation would have involved the sacrifice of several other communications. We therefore beg our readers to accept the editors' assurance, or else to prove by direct experiment, that the difference in figuring by the two systems is enormous.—Editors American Architect.]

COMPETITIONS IN INTERIOR DECORATION.

COMPETITION NO. II. — INTERIOR OF A BAY-WINDOW.

The subject of the second competition is a bay-window, as seen from the drawing-room in the second story of a city house. This drawing-room is fourteen feet high in the clear. The width of the room is twenty feet, and the opening of the bay is not to exceed ten feet. The plan of the bay, the scale of the drawings, — provident they are included on one sheet of the prescribed size, — and the materials used in construction, are optional with the competitor. The drawings required are a plan, an elevation as seen from within, showing how the opening is made to harmonize with the treatment of the drawing-room, a section showing the nature of the external treatment, and details to a larger scale than the principal drawings. The manner of supporting the wall over the opening of the bay should be indicated. The drawings must be received at the office of the *American Architect and Building News* on or before March 30. The conditions of this and of subsequent competitions will be the same as those which governed the first (see *American Architect and Building News* for Jan. 26). The scale of the various drawings should be represented graphically on each drawing.

NOTES AND CLIPINGS.

Town-Heating by Steam. — The experiment of heating the city of Lockport, N.Y., by steam under the Holly system, has, it is said, proved highly successful. The following results are reported: Three miles of pipe, covered with non-conducting material, laid underground, radiate from a central boiler-house; and fifty different dwellings and other edifices, including one large public-school building, have been thoroughly warmed all winter by steam thus distributed and turned on or off as required by the tenant. Dwellings more than a mile distant from the steam-generator are heated as readily as those next door. Steam-meters are provided, so that each consumer need pay only for what he uses. It is stated that the system can be so developed as to furnish steam at fifty pounds pressure, transmitted through twenty miles of pipe, which could, therefore, supply power for engines and manufactures, and steam for baking and laundry purposes, for extinguishing fires, for cleaning streets of ice or snow, or protecting hydrants from frost. The rates actually charged to the consumer do not exceed what his coal and wood cost him to produce the same result.

The West Point Hospital. — After the United States Government had begun to build a hospital for the Military Academy at West Point, it was discovered that the records proved that not more than seven cadets had ever been sick at one time, whereas the new hospital would accommodate about three hundred patients.

A Relic of the Exhibition. — Signor Guarnerio's immense bust of Gen. Washington, with which a little eagle was vainly trying to fly off, which afforded so much amusement to the visitors at Memorial Hall during the Centennial Exhibition, was lately sold at Philadelphia for non-payment of customs dues. One dollar was the highest bid that was made for it.

Burning Wells. — Near Green Sulphur, Ky., is a well which was bored by an old farmer some forty years ago, who expected to get salt water from which salt could be manufactured. The water was obtained, but so impure was it that the scheme was abandoned, and the unpleasant liquid poured itself into the Dix River. Some time afterwards one of a party of men while gigging fish by torchlight accidentally set fire to the surface of the river by dropping his torch. The flames spread rapidly in all directions, and the frightened inhabitants thought that the Day of Judgment was upon them. What flowed from the well, and was the cause of this conflagration, was of course petroleum. This has long since ceased to flow, and in its stead the shaft is filled nearly to the brim with a clear odorless brine which has this striking peculiarity, that, let a few buckets of water be drawn from the well, and the water will begin to boil and bubble furiously; then if a lighted match is dropped into the water, a column of fire will shoot into the air for several feet, burn for half an hour or so, and die down, only to shoot up again if more water is drawn from the well. Another and more remarkable burning well is near McConnellsville, O., where Mr. T. W. Williamson when boring for oil struck a vein of gas, apparently inexhaustible. Into the top of the boring three pipes have been fitted, through the largest of which about four-fifths of the gas escapes vertically. This has been lighted, and has for months burned steadily with a flame some twenty feet or more in height. By one of the smaller pipes gas is conveyed to a stationary engine which pumps oil from two neighboring wells, by the other, a three-quarter-inch pipe, gas is conveyed to the house where it is used for cooking, warming, and lighting, to the exclusion of all other fuels. As the gas is remarkably pure, and burns with clear white light, no odor is perceptible about the house.

Cremation. — Every now and then the advocates of incineration as a mode of disposing of the dead receive new recruits in this country and abroad, in persons who desire that their own bodies or the remains of their relatives shall be reduced to ashes; but it is easy to see that the commercial instinct has quite as much influence in the matter as the wishes of the deceased, or the belief of the survivors in the sanitary efficacy of cremation. That those who have built retorts and furnaces should demand a fee for their services, is only just; but that a husband should give a public lecture on the process and results of cremating the body of his wife, is only more abhorrent than the action of the man who uses the ashes of his eight-day-old child as samples when negotiating with possible clients.

Ice Machine. — There has lately been shipped to New Orleans a huge ice-machine, whose capacity is fifty tons daily. The gas-compressing pump and frame is 13 feet 6 inches high, and 6 feet 6 inches wide at the base; the cylinders have 24 inches bore by 36 inches stroke, and weigh 18,805 pounds. The refrigerant is liquefied ammoniacal gas vaporized and again liquefied by mechanical compression. The cold produced by the vaporization is 45 degrees below zero, Fahrenheit. The cost of manufacturing the ice in New Orleans will not much exceed one dollar per ton.

A Mound-Builders' Idol. — The workmen employed on the site of the new penitentiary at Chester, Ill., dug up, the other day, a figure which is supposed to be a relic of the mound-builders. It is an image, supposed to be an idol, sixteen inches high, made of slate or soapstone, and in a sitting posture. On its breast and abdomen are numerous figures and characters, including the picture of a man in a sitting posture, an elephant, and a human foot, and on the back are a horse's head, a frog, a fish, a turtle, etc. On the head is a band inscribed with some characters which may be hieroglyphics.

Casts of the Sculptures at Olympia. — Letters from Athens state that the moulder authorized by Government has started for Olympia, to take casts of the most recently discovered sculptures, viz., of the Apollo belonging to the west front of the temple, and of the Hermes of Praxiteles. When these reach Germany all the Olympian casts, collected now in the Campo Santo near the Cathedral in Berlin, will be publicly exhibited. The sculptures of the east gable are complete in all important parts. The above-mentioned Apollo — the central figure — is alone wanting to perfect the western pediment, a composition far more remarkable for life and action than is that facing the east.

Tin in Old River-Beds. — Running water leaves on the earth's crust marks as permanent as any of the violent convulsions of nature. The discovery has lately been made in Australia, that the streams of the tertiary period, streams many millions of years ago, but now dried up, are vast storehouses of wealth. They are carefully searched out and worked for tin. They acted in precisely the same way as the rivers of our own day, washing away the lighter rock, and leaving a concentration of the heavy ore in their channels. They vary considerably in depth, according to the remoteness of their origin. In one of them a shaft has been sunk to 80 feet, and at that depth the ground is a regular river-bed, with, in some places, a collection of loose drift sand, heavily intermixed with tin-ore. It has been opened at that depth, to the distance, horizontally, of 2,000 feet, and explored by boring from the surface for 600 feet more. The width of the seam has increased from 18 to 400 feet, and it contains an average of three feet of what the miners call "pay dirt," that is to say, soil worth working, for it yields about 1¼ per cent of metal, an excellent produce for tin-ore. Some of these deposits are discovered at only a few feet from the surface, a fact which shows that they are of much later date than the one referred to above, but still of immeasurable antiquity. The state of the earth also shows that these later rivers were not in action for very long periods, as the ore has been far less washed. Twenty-five of these tin-mines have already been found; and although the difficulty attending all new enterprises has retarded their development, yet within two years they have produced 2,650 tons of ore, worth about $1,000,000.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. III.] Copyright, 1878, JAMES R. OSGOOD & CO. [NO. 115.

BOSTON, MARCH 9, 1878.

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THE Trustees of the Pennsylvania Museum and School of Industrial Art have issued their report for 1877, the first since the opening of the School and of the Museum. They report that the School, which has included classes in drawing and design, in geometry and projections, and in needlework, with lectures on art, has been well attended and prosperous, while they discreetly warn their friends that decisive results are not to be looked for at once in such an undertaking. The Museum has proved popular,—nearly a hundred and fifty thousand people having visited it between the tenth of May and the first of January,—and the attendance on Sundays exceptionally large, especially during the favorable months, the number of Sunday visitors in September being over ten thousand. Among the articles in the Memorial Hall, and in addition to the things purchased at the time of the Centennial, are cited a collection of English pottery and porcelain from Daniell & Co., one of French and one of Spanish, all loaned at the instance of Mr. Cunliffe Owen, and a Persian collection purchased through him. To these are added the collections of the American Institute of Mining Engineers, a private one of lacustrine archæology, and many valuable private possessions, all loans; which with the old purchases, and the inevitable cork models of Windsor Castle and the Tower of London lately presented, should make up a valuable and useful exhibition.

WHEN will people learn that the design of a monument, instead of being the easiest of architectural tasks, is one of the most difficult? If we consider the crop which has sprung up since the war, we have to concede, that however it may be in other architectural work, we have by no means improved in the quality of our monuments in the last twenty years. The reason of this is probably, in part, that in the emancipation from rule which has followed the abandonment of traditional architectural forms everybody has come to think that he can design a monument; partly that this same emancipation has led incompetent designers to trust to any idea that occurs to them; and partly that in like manner the eye of the public or of those who select designs has lost the sense of propriety it derived from seeing only the severer and more monumental if commonplace forms of an older time, and is now pleased with vulgarities that in its days of greater fastidiousness would have shocked its sense of propriety. Yet we have very many more good designers, and better trained, than we had twenty years ago; the power to do good work has increased greatly: the difficulty is that the number of bad designers has increased in a still greater ratio, with their freedom. The public, pleased with the new idea that everybody can do every thing, and judge of every thing, and deprived of its old standards of propriety, bestows its favors with a catholicity that makes no distinctions between the capable and the incapable. We are led to say this by seeing in a recent number of the Baltimore *American* the design of a soldiers' monument which a committee of the Grand Army of the Republic is proposing, with the help of the Maryland legislature, to set up in Baltimore. It has been the custom to call Baltimore "the Monumental City." Its monuments are many, and though they are not strikingly fine, most of them have a degree of dignity and elegance which gives the town, as one in walking about it sees them in vistas right and left, a charm that is not to be found in another American city. There is the more reason then that this city should be careful what it adds to their number. The design we speak of, the work of Mr. G. Metger, has a kind of square battlemented pedestal, with four curiously convoluted corner buttresses, upon the feet of which rest trophies, and between which are steps leading up to inscribed tablets that cover the faces of the pedestal. The top of the pedestal is dressed flat, and in the middle of it lies what the author calls a dome, octagonal and studded with stars. Out of this rises an octagonal column of half the diameter of the dome. It has no base, but a wreath conceals its junction with the dome, and it has a high capital composed of American eagles with scrolls and shields. On the top stands a soldier, holding a flag. It will be seen that the designer has attempted an extremely perilous task; and he has not succeeded. The monument is thirty-five feet high, and the details are of the kind usual with the manufacturers of cast-iron stoves. It is to be hoped that the members of the legislature will think carefully before they help to occupy any square of their fair city with this undignified and illiterate performance.

THE lesson of the Tariffville bridge ought not to be lost; but there is a great deal of work to do in applying it. Professor Vose of Bowdoin College has been writing to the Portland *Argus* to complain of a bridge on the Maine Central Railroad, which he says has been in a very doubtful condition for six years. The railroad commissioners have in three successive years advised its removal, but it still stands, though it has been shored up in one or two places. Last month it was reported to have been tested by running a heavy engine over it at speed,—a test which, as Professor Vose says, is simply that which is constantly repeated on every bridge till it falls, and means nothing more than that up to this time it stands. It is a pity, by the way, that when apprehension leads to testing a bridge, some means should not be found which does not risk two men's lives and a valuable engine. It is probable that the country is bestrewn with bridges no stronger than this or than the Tariffville bridge. Most of them were built for a lighter traffic than that they are now required to carry; hundreds built by unskilful constructors and of perishable material are already falling into decrepitude. It is without doubt a severe tax on the roads to replace them, and will go hard with dividends. Most American railroads were undertaken with insufficient capital, and many on routes where there was not business enough to support well-equipped roads; so that they had to be built as cheaply as possible, and can barely struggle along with dividends, or even without, by the most economical management. But then, roads should not be built unless they can be made and kept safe; and the security of travellers must be preferred even to dividends.

We learn since the above paragraph was in type that plans have already been made for a new bridge on the Maine Central road, an example of improvement which we hope may be followed elsewhere. We have also heard of an ingenious invention for testing shaky bridges, which consists of a tender loaded with eighty tons of water, that is to be drawn across by a rope, at some distance behind the engine, and is so constructed that on the first intimation of an intention to yield on the part of the bridge, it can be opened and the water instantly discharged. The test ought to be admirable; but the management of it would be, we should think, a panicky business for the operator,—one into which the personal equation, as it is called, would enter largely,—and which, considering the promptness with which many bridges go down when they have made up their minds, would require the steadiness of an artilleryman, and the quickness of an astronomical observer.

UNDER these circumstances it is an encouragement to know that Mr. Garfield has brought up again in Congress the bill

presented by him at a previous session, and prepared by Mr. Adams, Massachusetts Railroad Commissioner. It authorizes the President to appoint a board of three general railroad commissioners, who shall be engineers in the United States Army. They are to investigate into and report upon railway accidents throughout the United States; inquiring into their causes, the number of lives lost, the means of prevention which have been, and which might have been, employed; and making a special study of important cases. Special reports are to be made as promptly as possible on these particular cases, and general reports annually to Congress. The bill, as we remember it, does not go so far as to provide any penalties for accidents, or to give the commissioners disciplinary powers, and so could be considered only as the beginning of precaution in railroad matters. But such a commission as it proposes would at least be likely to be fearless and impartial. Its recommendation would carry a certain weight, and its blame would probably produce a certain effect; though with the experience of England before us, where the people are better used to exacting responsibility than here, and where nevertheless the earnest representations of very able and efficient railway inspectors have failed to move the Government against the opposition of the great corporations, it is not worth while to expect too much.

Mr. Norman Shaw, who has won laurels by his cleverness in the use of old forms in architecture, and to whom, perhaps, more than to any other, we owe the complicated revival which has gone under the name of Queen Anne, has lately been reviving an old appliance which had escaped the attention, or else failed to attract the admiration, of his fellow architects. Most travellers in France notice, and seldom without more or less offence, we fancy, the outside drain-pipes which sometimes cover the walls of houses in the old towns, in complicated lines, with hoppers under each window, into which the occupants pour their chamber-slops. Stimulated by the sanitarian enterprise of the day, Mr. Shaw has found a use for these contrivances which is abreast of the wants of this generation. He uses them for soil-pipes, making a break for the entrance of air as soon as a pipe passes through the wall (which is as early in its career as possible), where it leads into a hopper, the break and the hopper being repeated at the surface of the ground. This keeps the pipe out of doors, and open to a free passage of air whenever air will pass through it, and by a free use of water he thinks that it is kept entirely void of offence. This discovery has provoked much discussion, and some admiration, in the English building-journals, but to our surprise we have not seen it either attacked or defended on the æsthetic side. From this point of view we cannot admire it, any more than we can admire the disposition, which we have seen in some English plans of considerable pretension, to fix the source of this adjunct in a place of honor near the front door, or the French habit of arranging it half way up the principal stairs. However absolutely successful Mr. Shaw's device may be, and we have some doubt whether it can be altogether so, it could at least do quite as well in a shaft of its own, we should say, as displayed on the façade of his house, and to greater satisfaction of the beholder. He has many admirers in the United States, but we are glad to think that in the greater part of the country his invention would receive no encouragement, at least from the climate.

We learn by telegraph the death of Mr. Joseph Bonomi, a noted English archæologist, the author of *Nineveh and its Palaces*. He was of Italian descent, his father, whose name he bore, being an Italian architect who emigrated to England in the latter part of the last century, and won distinction there. Mr. Bonomi was born in London in 1796. He studied sculpture at the Royal Academy, and in 1822 went to Rome to continue his studies. Travels in Syria and Egypt directed his interests to archæology. He attracted notice by discovering in Syria the triumphal monument, described by Herodotus, which Sesostris set up on the coast. After fifteen years' absence he returned to England, and continued his archæological work. He became the curator of the curious and interesting museum bequeathed to the English nation by Sir John Soane, the architect of the Bank of England, and still preserved in Soane's house in Lincoln's Inn Fields. He devoted a good deal of time to the study of the great alabaster sarcophagus brought from the neighborhood of Thebes by Belzoni, and enshrined in the crypt of the Soane Museum. In conjunction with Mr. Samuel Sharpe, he published in 1864 a description of this relic, with a translation of its hieroglyphics. These, curiously enough, prove it to be the sarcophagus of Ormaneptah I., father of the Rameses II. that is commonly identified with the Sesostris whose monument Mr. Bonomi had discovered in his early travels. He made the drawings on the blocks for a work on Egypt, Nubia, and Ethiopia, illustrated also by photographs, for which in connection with Mr. Sharpe he prepared the letterpress; and published several small works on Egyptian archæology. He was a fellow of the Royal Society of Literature and of the Royal Asiatic Society, to the Transactions of both of which he contributed.

Our columns have been for some time past under a pressure of material for which we cannot be too grateful; but which makes it reasonable that we should apologize to our contributors for delays and irregularities in our use of their favors, and to our readers for the omission and backwardness of things which they may expect to see. We shall be glad when we are able to enlarge our paper permanently: till then some delays and much compression are inevitable. Meanwhile, to any of our contributors who feel themselves aggrieved at the freedom with which we are obliged to treat them, we can say that if they could only be aware of the putting off, the rejections, and the rough handling to which the editors' contributions have to be subjected, they would feel themselves amply avenged.

THE CONSCIENCE OF A CONTRACTOR.

It happened not long ago that a certain contractor in Brooklyn, who had put in a bid of twelve thousand dollars for some city work, being found testifying against a confederate with whom he had quarrelled that the bid was a "steal," and that the work could be done for six thousand, was confronted with his declaration before a committee at the time the contract was awarded, that it was a reasonable bid. This he accepted so cheerfully that the cross-examiner asked him how much conscience he had; and he answered, the conscience of a contractor, no more. What the conscience of a contractor is according to the idea of this person may probably be inferred from one or two cases of special iniquity, which have lately occupied the attention of the Board of Health in New York. One of these, the trial of a builder named Buddensick on the complaint of the Board, has been conspicuous in the New York papers. The inspector who examined two apartment-houses on East Fifty-Second Street, built by Buddensick and containing some eight families, testified that he found in one an opening in a soil-pipe, through which its contents oozed out; a lighted candle held near it was almost blown out by the escaping air; higher up in the same pipe another opening let out more gas. Two persons were ill in the house, and one had just died, — of what disease was not reported. In the adjoining house the condition of the plumbing was substantially the same; and the inspector who had visited the house could thrust his fingers into the crevices at the joints of the drain-pipes. The builder was held in bail for trial. It is to be presumed that his case will be in some sort a test case, as his manner of building is apparently a fair sample of what is common in the cheaper apartment-houses of New York. The New York *Sun* published some time ago a report of an examination made by the same inspector, Mr. Nealis, of another block of apartment-houses. These were five houses of some pretension, with stone fronts, and arranged in suites for six, eight, or more families in each. The plumbing here was a little worse, it would seem, than in the Buddensick houses, the soil and waste pipes being thrust without any packing into the branches of the drains, the waste-pipe being only calked where it was in sight; and with holes here and there, where lighted candles and matches were blown out.

There is a plenty of evidence, that it would be simply tedious to cite, which shows that this sort of work is by no means exceptional, and that thousands of people in New York are pretty steadily poisoned by the criminal negligence,

— no, negligence is not the word, — by the criminal care of builders and speculators in slighting their work. These faults are difficult to trace, for plumbing is work easily concealed, and it is the habit in these houses to case the pipes sedulously in such a way that they can only be reached with great difficulty. In the five houses just mentioned, the system was carried out with artistic breadth and completeness by ornamenting the walls and ceilings with gas-plugs here and there, which were simply ends of pipe thrust into the plaster, the houses not being piped at all. What the building-contractors do in their way, other contractors do in theirs, until in many minds contract-work is become a synonym for bad work, and the whole contract system is coming into bad odor.

The most obvious cause of the growth of bad building is the conversion of building into a business instead of a trade, the substitution of the speculative spirit for the spirit of the workman. The cheap work of the day is done mostly by men who have never properly learned their trades, often by men who have never pretended to, and who therefore have neither the capability, nor the pride in good work, that belong to the well-trained mechanic. Men go to building, not because they are mechanics or wish to be, but because the chances of trade allow them to make money out of it. Workmen have found out that enterprise and shrewd calculation will bring them to the top — that is, will enable them to fall to building on their own account, and to making money — faster than skill and faithful work. The commercial element instead of being the servant of the mechanical is its master. The contractor (of this class) does not buy his material and hire his men for the sake of his work, and expect to get his payment for doing it well: he regards the work simply as an opportunity for making certain trades in material and labor on which he hopes to be lucky enough to get a good profit. Since he neither understands his work thoroughly, nor takes any interest in it, of course he does it badly. There has thus grown up a class of builders who are in responsible positions, who control a very large amount of building, and exercise a great influence by the work they do, by their example, and by the training they give their workmen, and whose whole intent it is to turn out bad work. If we add to their influence that of a fever of speculation and eagerness for quick profit which leave but few men in business patient of the deliberate gains which make business safe; the pressure of capitalists who are in haste to invest their money in buildings for the quickest and largest return; and the pressure even of those who wish to build for their own use, but whom the luxurious habit of the day makes universally eager to put more things into their houses than their money will properly pay for, — we have a conflux of influences which is enough to account for almost any degree of decadence. Finally, when we take into account a popular disregard of commercial and political honesty, which it is not our business to discuss, but which has spread over our country till no honorable man outside its influence can either forget it or think of it without dismay, and remember the kind of adventurer that comes to the surface in politics and commerce, we must confess that the cheap and reckless contractor is not such an exceptional monster, after all.

That the kind of conscience claimed by the New York witness was a kind which pervades a large class of men who build houses, as contractors or speculators, must therefore be acknowledged. It is the kind of conscience which many people take for granted in those they deal with, and the expectation of it naturally encourages its growth. Fortunately there are contractors and contractors, and every architect knows that it is always possible to find contractors who will fulfil their engagements squarely and honorably, and will take pride in doing their work well. If all buildings were directed by architects who respected their profession, or by other capable persons, dishonest contractors might be commonly restrained from mischief or avoided. If everybody built or ordered his own house, the speculative builders would be driven from the field. If contracts were abolished, houses might be better built by day's work at greater cost. But the contract system is not likely to be done away with, even by the legislation of the working-men's party, and there will still be contractors, the dishonest as well as the honest; nor will they always or commonly have architects to choose or control them. People will build houses for other people to buy and inhabit, and the speculative builder will still infest the land. What, then, is the protection to which we must look? for protection is clearly become necessary.

For that part of the public which cannot protect itself, since it takes its houses ready made, buying or hiring what it can get, with an enforced preference for cheapness and an innate preference for what is showy or promises the rudiments of luxury, there is no protection possible, so far as we see, but by legislation. The building-laws in our cities deal too exclusively as yet with such parts of buildings as concern their stability and their security against fire. To make them adequate they should contain stringent regulations as to the quality of plumbing and draining work in them. They will not be made duly efficient, in our opinion, until the severe penalties which are affixed to manslaughter are declared against persons to whose bad building fatal accidents or deadly illnesses can be traced. Such rigor of law is not unknown elsewhere, and is found salutary: the public safety seems to require it here.

As to men who get their own houses built for them, the remedy is chiefly in their own hands, or their architects'; for as we have said there are always trustworthy contractors to be had, and for all kinds of work. The men who go deliberately into a trial of skill with contractors whom they do not trust deserve what may befall them; though unhappily the casualties which follow are not likely to injure them alone. But it concerns architects to use all their influence not merely against bad building, but against the business connections which lead to it. They ought to do their best to make patent the distinction between good and bad builders, which cannot easily escape them; to set their faces against the employment of the incapable and those of questionable honesty. Especially it behooves them to distinguish those who have jumped into their employment for the sake of speculation, from those who have properly learned their calling and honor it, and to turn them the cold shoulder. We know the difficulties that beset architects in this matter. We know how clients constantly urge them to build more cheaply than they ought, how often they are pressed to employ mechanics whom they distrust. We know that in the eyes of many clients the architect earns his fee in a great part as a champion against the expected knaveries of contractors. We remember a case where a man of business, of mark and influence in his city, said to his young architect, who objected to pressing a certain contractor for a very low estimate, on the ground that it would lead him to try to cheat, — "You can let him estimate as if he were going to cheat, and then take very good care that he doesn't." One cannot easily imagine a more demoralizing precept, short of a downright recommendation to dishonesty, than this; but it probably represents the more or less unthinking attitude of a large class of clients. Architects need to resist it continually and firmly. The architect is in a certain aspect the servant of his client, as a lawyer is or a physician. But he is a good deal more than this. He is the director of one of the great departments of civil industry, and in this aspect is responsible for his influence on the community, — which may be and should be very great. It is his chief office as an architect to provide his community with good houses, churches, and the like, to live, work, and worship in. To this end he and the builder ought to work in honorable fellowship. It is a poor condition of things if their common occupation degenerates into a struggle to outwit and to detect. When the architect accepts a position in which his chief duty is to keep the conscience of a contractor, it is a lamentable descent from his honorable place.

DI CESNOLA'S CYPRUS.[1]

GEN. DI CESNOLA'S discoveries in Cyprus, if of less curious interest than those of Dr. Schliemann at Mycenæ, are not of inferior importance as a contribution to the history of ancient art, and as affording material for the solution of some of the most perplexing questions in respect to the influence of earlier civilizations upon that of the Greek race.

Though the position and history of Cyprus might well have tempted explorers, very little had been done for the investigation of its antiquities previous to Gen. di Cesnola's researches. His

[1] Cyprus: Its ancient Cities, Tombs, and Temples. A Narrative of Researches and Excavations during ten years residence in that Island. By Gen. Louis Palma di Cesnola. With Maps and Illustrations. New York: Harper & Brothers, 1878. 8vo.

narrative of his ten years work is written with such animation and simplicity as to make his book attractive to the general reader, while his lucid and comprehensive description of the progress of his discoveries, and of the works brought to light by his energy and intelligence, is such as to give to his work a higher quality than mere entertainment.

We commend the book to all our readers. It has already been so widely noticed, that we may assume that its general character is already known to the mass of them; and we therefore do not propose to give a summary of its contents, but to point out the nature of the more important contributions to the history of ancient art made by its author's discoveries.

So far as regards architecture, Gen. di Cesnola's investigations show that little is to be learned from Cyprus. The character of building here, as elsewhere, was determined by the materials at hand. Cyprus was not rich in good building-stone. The intimate relations of the island with Assyria, both directly and through Phœnicia, gave to its people acquaintance with the use of wood and sun-dried brick in structures of great size and splendidly adorned. These materials the Cypriotes seem generally to have adopted; but in the plan of their edifices they followed Greek rather than Egyptian or Oriental designs. And the main interest of all the Cypriote antiquities lies in the fact that while they exhibit a native tendency of no great force of expression, they show the intermingling and counteracting effects of three great currents of African, Asiatic, and European influences, here where, more than anywhere else in the ancient world, the streams of these widely separated sources met. The result of their mingling affords most instructive illustration of the obscure facts concerning the relations of ancient peoples, and the transference of the arts from one land to another. If, for instance, the works of art discovered by Dr. Schliemann at Mycenæ are remnants of the civilization of the Achæan race in the Peloponnesus, the similarities between many of them and the productions of Egyptian or Assyrian art become more easily explicable when we find precisely similar conformities in the earliest Cypriote works, at a period before the record of history begins, when the Greek race was already settled in the island. Œnyrus, the legendary hero of Cyprus, may not have been of Greek origin, but his myth was wholly Greek: according to it, he sent armor to Agamemnon, which Homer (Il. xi. 19) describes; but failing to send the ships he had promised, Agamemnon, on his return from Troy, landed at Cyprus, expelled the king (who, according to another version of the myth, was slain by Apollo), and settled a band of Greek colonists at Amathus. Now, this tradition may or may not have a basis in prehistoric facts; but no one who will compare the figures of pottery and of gold and silver work in Schliemann's and Di Cesnola's volumes can fail to recognize the essential similarity, not only of execution, but also of design in the early work from the island and the mainland. The Assyrian and Egyptian influences show themselves with more force in Cyprus, as was to be expected; but they do not there, any more than at Mycenæ, control the character of the work. In both there is a new spirit, which after many centuries was to find expression in what is known as Greek art.

Much is still left to be ascertained concerning this primitive period; but if the remains discovered by Di Cesnola and Schliemann be studied in connection with the antiquities recently found by the late Herr Salzmann and Signor Biliotti at Rhodes, and with such fragments of the work of the same period as have been found in Crete and elsewhere, it will be seen that we already are in possession of material sufficient to afford a tolerably wide and exact view of the characteristic features of Greek art in its earliest conscious stages. We have got behind the archaic period of historic art, to the productions of a period of indefinite dates and uncertain duration; behind the Dorian invasion, to a time when the Achæan civilization was reaching the height that is indicated by the Homeric poems. To the student of the meaning of lines, and of the indications afforded by ornamental design, there is abundant evidence in the decorations of the pottery, and in the shapes and motives of the gold and silver work, of an art distinct from those of Egypt and Assyria, though still affected by their traditions; distinct also from that of Phœnicia, and, on the other side, from that of Etruria; an art that gives evidence of independence and capacity of growth, and which has in it the seeds of highest ultimate excellence.

The very fact which has led to the disappearance of all the ancient architecture of Cyprus has been the means of the preservation of much of the sculpture. The falling in of the walls of the temples when their wooden columns were destroyed, or their stone columns overthrown, did not injure the sculptures within them as if the walls had been of stone. Indeed, the fallen mass of clay formed a protection to the works buried beneath it; and Gen. di Cesnola's animated and graphic account of his difficulties in unearthing the hundreds of marvellously preserved sculptures from the Temple of Golgoi shews how completely effective that protection had, in the course of time, become. Few works of such ancient date have come down to us in such perfect freshness, and so free from defacement of any sort, as these statues. In looking at them it is hard to believe that they are old; and one cannot compare them with the mutilated fragments of the splendid statues which the Germans are discovering at Olympia, without a certain resentment at the freak of fortune in subjecting these latter works to a harsh treatment in such inverse proportion to their merit as works of art and their interest as monuments of history. For though the Cypriote sculptors reached a considerable excellence in the delineation of individual characteristics, and, owing to the quality of the stone in which they worked, succeeded in an often exquisite rendering of detail of wreath or hair, there is no work of their hands, among the multitude discovered by Gen. di Cesnola, that belongs to the higher regions of art, or that adds to the types of ancient beauty or ideal character. In the long line reaching in a series of extraordinary archæological interest from the comparative vigor of an archaic period to the decrepitude of late Roman centuries, the art rarely breaks through the enfeebling limits of conventionalism. Cyprus was never wholly Greek: Tyre was nearer to it than Athens.

The most remarkable of Gen. di Cesnola's discoveries was that of the treasury at Curium; "a discovery," says Mr. Newton of the British Museum, than whom there could be no higher authority, "to which there is perhaps no parallel in the annals of archæology." Here in a series of underground chambers, beneath the fragmentary ruins of what may once have been a temple, was found the richest store of articles of gold and silver and of other precious materials that has ever been at once unearthed. The question when this treasure was accumulated and deposited cannot yet be determined, and nothing is known of the circumstances under which the knowledge of its existence was lost. The multitude of precious articles of which it was composed — bowls, vases, cups, dishes of gold and silver, rings, ear-rings, necklaces, bracelets, armlets, gems, etc. — are of various periods from seven or eight hundred years B.C., to perhaps even later than the time of Alexander the Great, and are of different origin and workmanship, Egyptian, Assyrian, Phœnician, Greek, and Cypriote. Many of them are of exquisite design and execution, and among the gems are some which belong to the very highest class of ancient works of the glyptic art.

In a long appendix to Gen. di Cesnola's narrative, Mr. C. W. King, the well-known authority on ancient gems, has given an interesting and detailed account of the rings and gems in the treasure of Curium. This treasure is now the chief adornment of the Metropolitan Museum of the Fine Arts in New York, and, together with the other antiquities discovered by Gen. di Cesnola, forms a unique collection, of the highest interest to the student of ancient art. The possession of such a collection involves a heavy responsibility; and the trustees of the Museum should lose no opportunity to add to their present invaluable store the works of other regions by which a consecutive view of the progress and character of classic art may be obtained by the student who has not the opportunity of visiting the great European collections. It is a great pity that the Castellani collection of ancient art has been allowed to leave the country. The Italian pottery is of no worth in comparison.

THE ILLUSTRATIONS.

THE MUTUAL LIFE INSURANCE COMPANY'S BUILDING, BOSTON, MASS. MESSRS. PEABODY AND STEARNS, ARCHITECTS.

SKETCHES FROM ROTHENBURG BY MR. L. S. IBSEN, ARCHITECT.

PERSPECTIVE STUDY. — PLATE V.

See the "Paper on Perspective" in this number.

DESIGNS FOR A STAIRCASE. — COMPETITION NO. I.

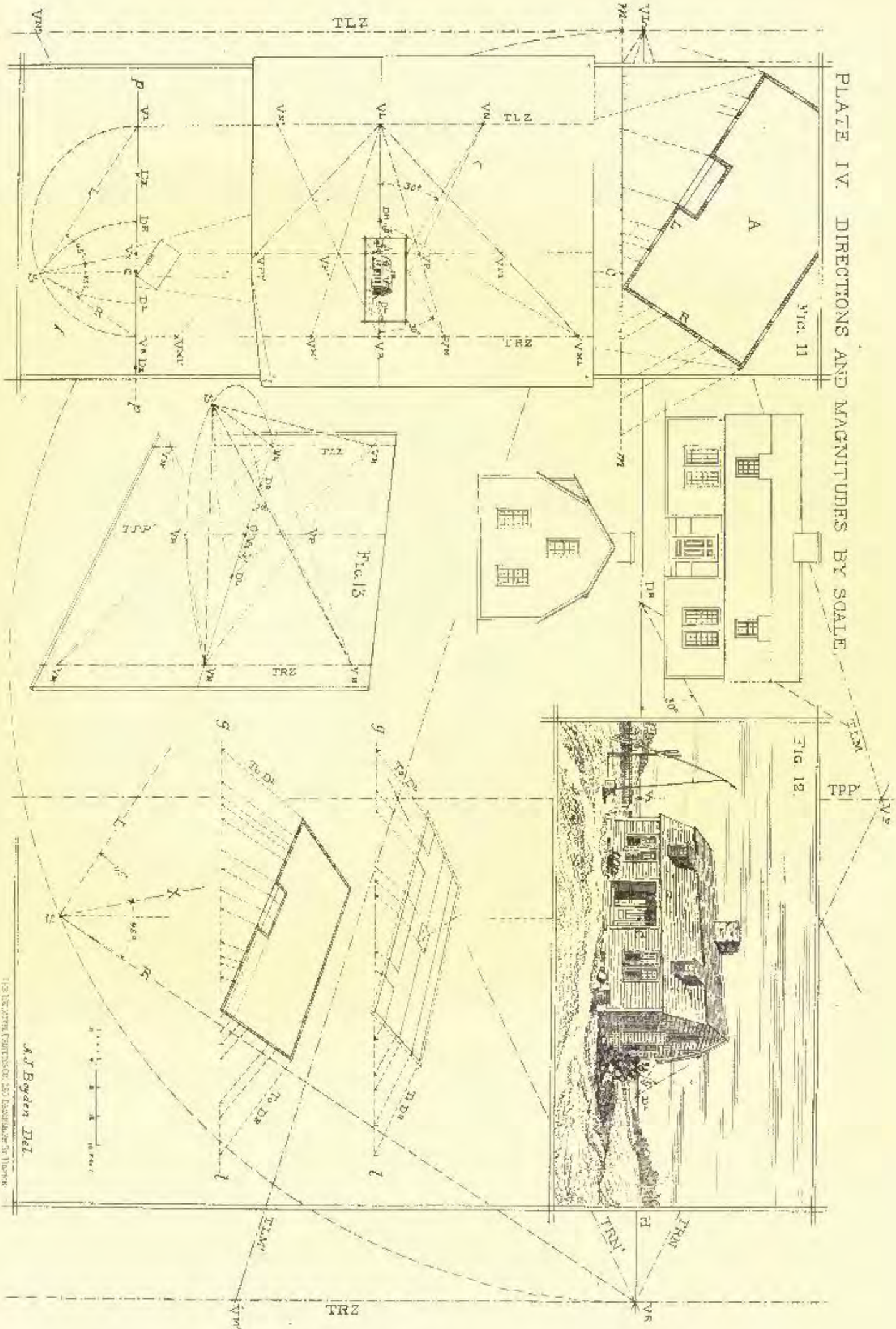
The committee, after much consideration and considerable difference of opinion among themselves, agreed at last to recommend the sketch signed "A. B. C." for the first prize, and that signed "1878" (surmounting a shield) for the second.

Of the twenty-eight designs submitted to them, they found seventeen to be good, and eleven to be poor; drawing a line that separated those good enough to build from, or to receive a prize in the absence of any better ones, from those that were not. Of the whole number, there were seven that distinctly affected mediæval details, and seven that were equally influenced by some sort of classical precedent, mostly of the modern Elizabeth-Anne fashions; two were in a nondescript style. The rest, twelve in number, seemed free from any particular historical influence, being designed on general principles, with more or less reliance for effect upon the forms suggested by the handling of the material employed, such as brackets, sheathing, panels and posts, chamfers, sinkages, and turned mouldings. There was, in general, a marked absence of merely decorative carving, the treatment being highly architectural.

In giving their judgment, the committee were influenced by the excellence of the draughtsmanship, and the elegance or picturesqueness of the composition, as well as the principles of design involved, and apparent novelty of invention. But without an exhaustive knowledge of precedent, to which they could not pretend, they could not, of course, tell whether things were really original, or only new to them.

In addition to those which the editors have selected for publica-

PLATE IV. DIRECTIONS AND MAGNITUDES BY SCALE.



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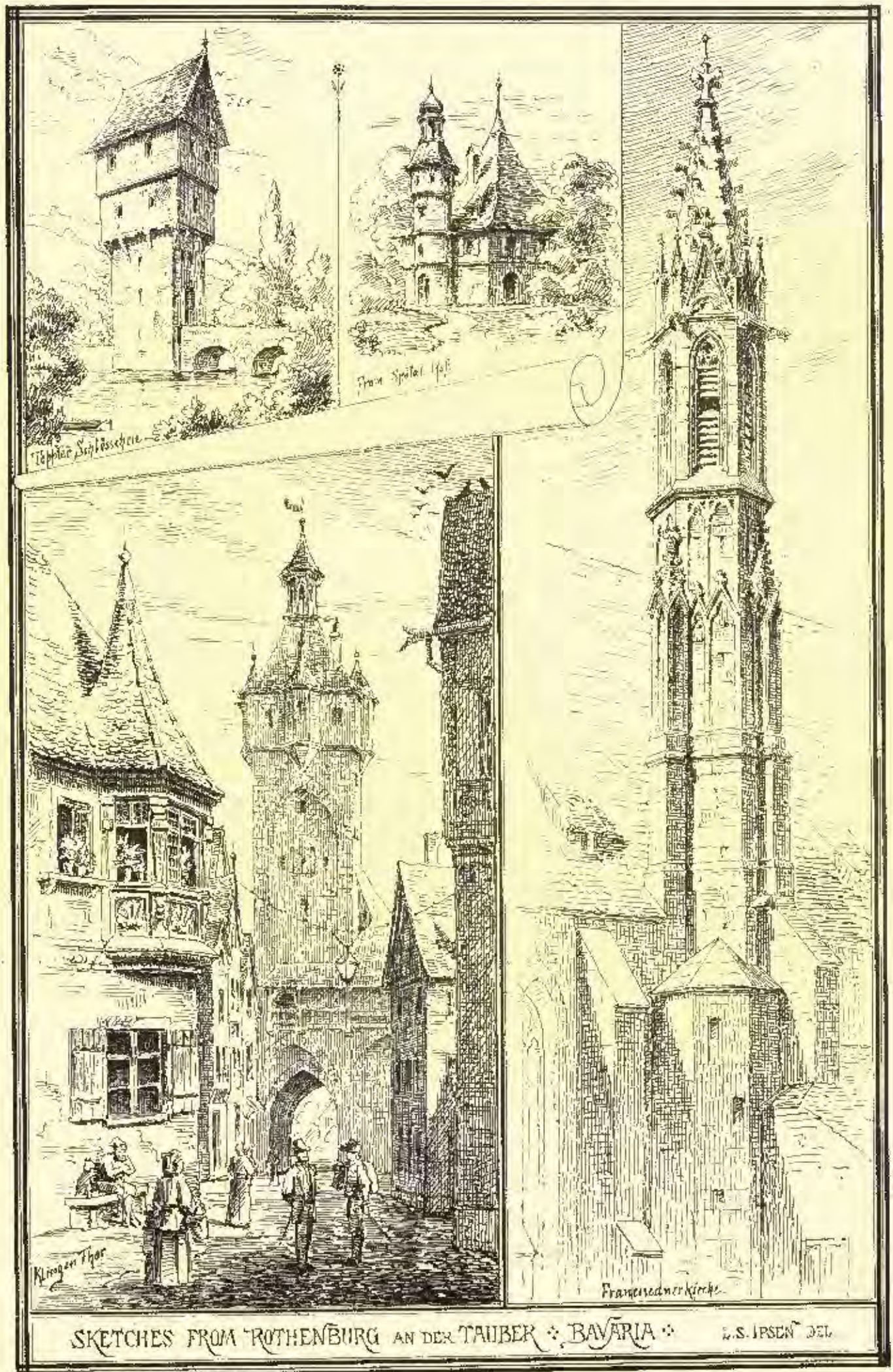

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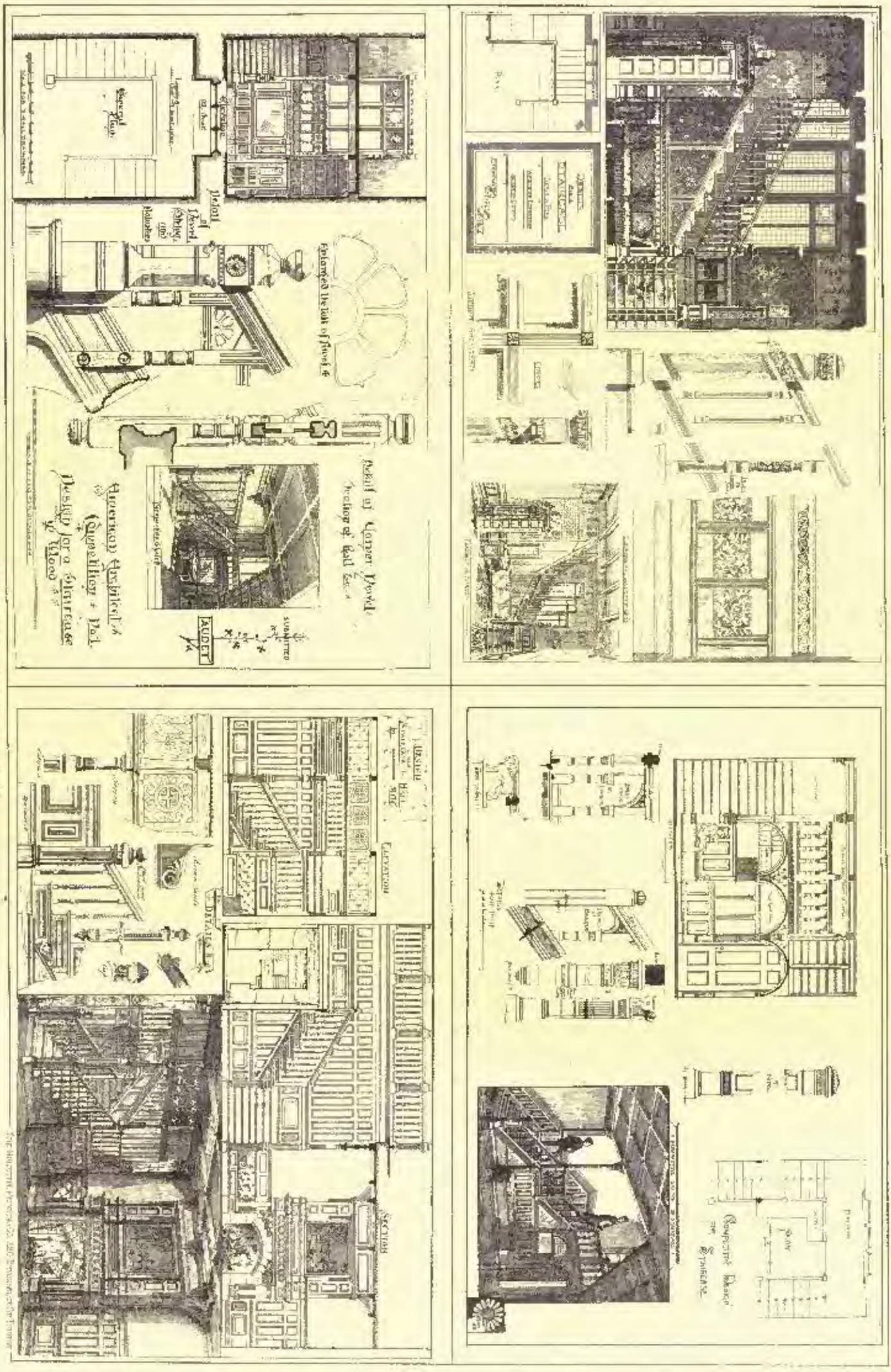

tion, the committee mention with commendation those marked "St. Austell," "Essayon," "T-Square Pasha," "With Hope," and a fifth signed with a Japanese fan. The design by "Tempus Fides Vis," although published, was ruled out of the competition, because of the date of its receipt.

PAPERS ON PERSPECTIVE.

V. — ON THE EXACT DETERMINATION OF THE DIRECTION AND MAGNITUDE OF PERSPECTIVE LINES.

THE first two of these papers were given to a general observation of the phenomena of perspective, in nature and in drawings, and the last two to an explanation of the practical making of such drawings, certain data being assumed. It was assumed that the position of the principal vanishing points, giving the direction of the principal lines, had been already determined, with more or less accuracy, by the eye or by the judgment, and that their length had also been fixed in the same way. The discussion showed how the position of other vanishing points and the length and direction of other lines could then be determined, and how any of the lines thus drawn could be divided up in any desired manner, that is to say, in any given proportion.

It is necessary, in order to conclude this part of the subject, to show how these data may be more precisely determined. It is necessary to show how, when the real direction of lines is exactly known, their vanishing points may be fixed with precision, and how, when their real length is known, the exact length and position of their perspective representations may be determined. The position of the object to be drawn, the position of the picture, and the position of the spectator's eye, must of course be known also.

85. Plate IV. shows how these questions are answered: Fig. 11 showing in plan, and upon a reduced scale, the position of the spectator at the station point S; that of the picture at *p p*, which shows the plane of the picture edgewise as it would appear looking down upon it; and that of the object to be represented at A. Two elevations of this object, which is a small house, showing its vertical dimensions, are given alongside; the plan and the two elevations together giving exact information as to the magnitude and direction of the lines defining it. The picture itself is shown between the plan of the house and its own plan, just as if the plane of the picture, *p p*, had been revolved backward into the plane of the paper.

86. The object is here represented as being about six times as far from the station point as the picture is, the picture being about eighty feet from the station point, and the nearest corner of the house about thirteen feet. It is this relation that obviously determines the *scale* of its perspective representation, which would be greater if the picture were farther from the station point, or the object nearer, and *vice versa*. But we shall come to the question of scale presently.

87. The first question is that of the direction to be given to the various perspective lines; we must determine the vanishing points of these various systems of lines, horizontal and inclined. The horizontal lines belong to three systems, the directions of which are indicated in the plan of the little house as R and L, going off to the right and to the left, at right angles to each other; and X, dividing the angle between them, and making an angle of 45° with each. If now the spectator, standing at S, looks in a direction parallel to R, he will see the vanishing point of that system of lines directly before his eye; that element of the system which passes through S is in fact seen endwise, appearing as a point covering and coinciding with the vanishing point of the system of right-hand horizontal lines, which is in the infinitely distant horizon. The perspective of this vanishing point, V^R, in the plane of the picture, will be found exactly where this element pierces the picture, that is, where it crosses the line *p p*. V^L and V^X can of course be found in the same way; and the centre of the picture, C, the point nearest the station point and at the other extremity of the axis S C, is easily determined at the same time. Since R and L are at right angles, the triangle V^X S V^L is a right-angled triangle, and S lies on the circumference of a semicircle of which V^X and V^L give the diameter. In the picture itself, just above, these points of course appear on the Horizon; for since these lines are all horizontal, their vanishing points lie in the trace of the horizontal system of planes. T R Z and T L Z, the traces of the vertical planes parallel to the sides of the building, can now be drawn, as usual, through V^R and V^L; and T P P', the trace of the diagonal planes, through V^X. The vanishing points of any other horizontal lines and the traces or horizons of any other vertical planes could of course be found in a similar manner.

88. It only remains to find the vanishing points of the inclined lines M and M', N and N', and thence, as before, the traces of the roofs, and the vanishing points, P and P', of their hips and valleys. This is easily done by the aid of the elevations, which show the real inclination of these roofs and gables to be 60° for the lower slope, and 30° for the upper. If the spectator at S, then, while looking at V^R in the direction R, should raise his eyes at an angle of 30°, he would see V^M, the vanishing point of the upper slope of the gable, directly before him, the triangle V^M V^R S being right-angled at V^R. If now this triangle were revolved about the vertical side V^R V^M, so as to bring the station point S into the plane of the picture at D^R, it would appear in the picture above as the triangle V^M V^R D^R, the angle at D^R being 30°.

Fig. 13 gives a perspective view of the plane of the picture *p p* with the eye at the station point S in front of it; the triangle in question is shown both in its original position and also as it appears when swung round into the plane of the picture.

89. It follows from this that if from V^R the distance V^R S is laid off along the Horizon, we obtain the point D^R, and if from this point we draw a line at an angle of 30°, we shall obtain V^M at its intersection with T R Z.

In the same way D^L and V^N may be obtained by setting off the distance of S from V^L along the Horizon from V^L, and drawing the line D^L V^N, also at an angle of 30°.

The points D^R and D^L are called the right-hand and left-hand points of distance; they show the distance of the station point from the right-hand and left-hand vanishing points. It is to be observed that D^R is found on the left and D^L on the right of C.

90. $V^{M'}$ and $V^{N'}$ will of course be seen as far below the Horizon as V^M and V^N are above it, and V^P and $V^{P'}$ will be at the intersection of the traces of the inclined planes R N, L M, R N', and L M', as before.

In the same way the vanishing point of every other horizontal line, as, for example, of V^X, has its corresponding point of distance, found by setting off along the horizon its distance from S. Thus we have V^X D^X equal to V^X S.

91. By a reverse process, when the vanishing point of inclined lines is known, their real inclination can be discovered by drawing a line from this vanishing point to the point of distance of the horizontal line beneath them. Thus in the figure a line from V^P to D^X gives the angle V^P D^X V^X, which is the true slope of the line of intersection of the roofs.

92. If the lines M and N have different inclinations, the point V^P will of course not come over V^X, and the distance must be measured from the point of the horizon that it does come over.

The vanishing points of the steeper slopes of the lower roofs are found in like manner at $V^{M'}$, $V^{N'}$, etc.

93. The exact direction of perspective lines being thus determined, since the position of their vanishing-points is thus exactly fixed, it now only remains to determine their length, and the position of some one point in each. For such lines as are parallel to the picture this is easy. For every such line may be considered to lie in a plane parallel to the picture, the centre of which, or point in the plane nearest the eye, will have its perspective at C, the centre of the picture; the perspective of the line in question will be parallel to the line itself, and its length and its distance from the centre C, and all other lengths and distances taken in that plane, will be less, as we have just seen (86), in proportion as the distance of the plane from the plane of the picture is greater. If, as in Fig. 11, the plane *m m* is six times as far from the spectator at S as the picture *p p*, all lines in *m m* will be drawn at one-sixth of their original size, and be at one-sixth their distance from the centre. The front corner of the house, for instance, which lies in the plane *m m*, is so drawn.

This imaginary plane *m m*, which is generally drawn through the nearest part of any object to be represented, is called the *plane of measures*, and, like the picture, is defined in position by the length and position of its axis, which coincides with that of the picture, but is generally a great many times as long.

Its relative distance behind the plane of the picture is commonly, of course, much greater than that shown in the figure, in which, for perspicuity's sake, the picture is represented as being about eleven feet across and about thirteen feet from the spectator. The picture is commonly set only a few feet off, while the object represented is often a hundred times as many.

Fig. 13 gives further illustration of most of these points. To prevent a confusion of lines, the centre, C, is taken on the left-hand side of the picture instead of on the right-hand side, as in Fig. 11.

94. It follows from what has been said that any line drawn in the plane of measures in any direction, horizontal, vertical, or inclined, is also parallel to the picture, and that its perspective will be parallel and proportional to it, but on a smaller scale. This scale depends on the relative distance of the picture plane and the plane of measures from the eye, or station point. If the latter is twice or ten times as far away, lines drawn upon it will be presented in the picture one-half or one-tenth full size. *All lines in the plane of measures have their perspectives drawn to the same scale.*

It is common, in the case of large objects, such as buildings, to set the picture at just $\frac{1}{10}$, $\frac{1}{12}$, or $\frac{1}{16}$ of the distance of the plane of measures, i. e., of the object. Lines in the plane of measures are then represented $\frac{1}{10}$, $\frac{1}{12}$, or $\frac{1}{16}$ full size, etc.; that is to say, on a scale of $\frac{1}{8}$, $\frac{1}{10}$, or $\frac{1}{16}$ of an inch to the foot.

The centre of the plane of measures coincides in perspective with the point C, the centre of the picture (93). The perspective of any other point in the plane of measures may be found by laying off its distance, according to the scale, in its real direction, in the plane of the picture.

95. Fig. 12, in which the various vanishing points and traces, and the points of distance D^R and D^L, are determined as in the

previous figure, illustrates this practice. The picture is supposed to be about six inches from the eye, as in the case of our previous illustrations. This is less than is desirable, but is as much as the scale of these illustrations permits. The front corner of the building, through which the plane of actual measures is taken, is supposed to be a hundred and ninety-two times as far away, that is to say, ninety-six feet from the spectator, or ninety-five feet and a half behind the picture, the scale of the perspective of that corner being one-sixteenth of an inch to a foot. This corner, being eight feet high, is drawn half an inch high. All other lines in the plane of measures are drawn to the same scale, which is indeed the same scale as that to which the plan of the building is drawn in Fig. 11, and the elevations alongside. Dimensions can then be transferred directly from these drawings to Fig. 12, so long as the lines to which they apply lie in the plane of measures, as the front corner does. The line *g l*, for instance, called the ground line, or line of horizontal measures, in which the plane of measures intersects the horizontal plane on which the perspective plan is taken, is such a line, and any dimensions can be laid off upon its perspective at the same scale as upon that of the vertical line; as it is parallel to the picture, the divisions of its perspective are proportional to those of the line itself.

The front corner of the house is the line in which the planes of its front and end walls intersect the plane of measures: by prolonging the planes of the other walls until they intersect the plane of measures, additional lines of vertical measures are obtained. In the same way every horizontal plane gives a line of horizontal measures, as is shown in the case of the two perspective plans below.

96. For very small objects the plane of measures, and with it the object itself, is brought nearer, and may even coincide with the plane of the picture. In this case lines lying in it are drawn full size.

Sometimes, instead of taking the object of its real size at its real distance, we suppose a miniature of the object to be set up near at hand, of any convenient scale. In this case the object may be supposed to be close to the plane of the picture, and the plane of the picture to coincide with the plane of measures.

This is illustrated in Fig. 11, in which a small plan of the house is drawn in contact with the plane of the picture, *p p*, just as a large plan, representing full size, is drawn in contact with the plane of measures *m m* above, the whole being drawn at a scale of sixteen inches to the foot. Or we may regard Fig. 11 as drawn on the same scale as Fig. 12, that is to say, full size, considering the plane *m m* to be the plane of the picture, six inches from the eye at S, with a miniature of the building, a model made to the scale of a sixteenth of an inch to the foot, just behind it.

97. Having thus the means of drawing in any horizontal or vertical plane a line, lying in the plane of measures, upon which dimensions can be laid off by scale, we have now to transfer these dimensions to other lines in the same plane.

If these lines also are parallel to the picture and to the plane of measures, the case presents no difficulty. It is only necessary to draw parallel lines from one line to the other. In the figure, for example, the heights laid off on the front corner are transferred to the other corners and to other vertical lines by parallel lines directed to the vanishing points V^R and V^L. In this way the vertical dimensions of every part of an object, and the position of its horizontal lines, may be determined.

The length of any other lines parallel to the picture, horizontal, vertical, or inclined, may be obtained in a similar way from lines in the plane of measures parallel to them, and lying at the intersection of that plane with the planes in which they lie.

98. To determine the length of the horizontal lines not parallel to the picture, and to lay off given dimensions upon the perspective of such lines, we can employ a method similar to the method of triangles described in the last paper. By that method we laid off upon such lines parts *proportional* to parts taken upon a line of *proportional* measures. We now propose to lay off upon such perspective lines parts *equal* to parts taken upon a line of *real* measures. Any triangle will do to transfer proportional parts, but to transfer equal parts we must have an isosceles triangle; for it is only in isosceles triangles that the parts into which the adjacent sides are divided by lines drawn parallel to the base are equal, each to each.

This is illustrated by Fig. 11, in which the line *m m*, at the top, is the line of horizontal measures. The actual dimensions of the sides of the house and of the doors and windows are laid off on this line, and connected with the inclined lines of the plan by means of lines drawn parallel to the base of an isosceles triangle.

99. It is plain that what is here done in the orthographic plan could be done in a perspective plan if we knew in what direction to draw these parallel lines; that is to say, if we could find the vanishing point of the base of the isosceles triangle.

And this is, in fact, very easy, for a simple inspection of the figure shows that the *point of distance* is the auxiliary vanishing point in question. If the spectator at S looks in the direction of the parallel lines by which the right-hand line R is divided, he will see D^R, and in like manner D^L is the vanishing point of the parallels by which distances taken on the line of horizontal measures are transferred to L.

And that this is as it should be, is plain from a further inspection of the figure. For the sides of the isosceles triangles at the top are by construction parallel to the sides of the triangles $SV^R D^R$ and $SV^L D^L$. These last are accordingly isosceles too, and their two long sides should be equal. The auxiliary vanishing points, then, should be just as far from the vanishing points as these last are from the station point; as the points of distance are (89).

100. The points of distance, then, are the vanishing points of the parallel lines which will intercept upon a perspective line parts equal to those intercepted upon its line of measures.

This is illustrated in Fig. 12, where, in the perspective plan parts laid off by scale on the ground-line, or line of horizontal measures, are transferred in their true dimensions to the perspective lines R and L. In this way the length of the walls and the position of the doors and windows is exactly determined. These dimensions being already shown at the given scale in the little elevations, it suffices to transfer them directly from those drawings to the ground line with a measuring strip.

In this way a complete *perspective plan* can easily be constructed; the length of all horizontal lines and the position of all vertical lines will then be known. The length of vertical lines, which gives the position of horizontal ones, is easily obtained, as we have seen, from vertical lines of measures.

The second perspective plan, above the other, gives the plan of the roof and dormers.

101. Fig. 11 affords an alternative method of obtaining the horizontal dimensions; that is to say, the position of the vertical perspective lines. If we again regard the plan at the top as the plan of a miniature house, or model, set six inches from the eye at S, and regard *m m* as the plane of the picture, in contact with it, we can, by drawing lines from every point in the plan to the station point, find just where every point will appear in the picture; the horizontal dimensions thus obtained can then be transferred directly to the picture in Fig. 12. They are shown by marks on the lower side of *m m*, and will be found to agree exactly with the dimensions obtained from the perspective plan.

This method, which is called that of *direct projections*, is often more convenient than the other, especially when the orthographic plan has previously been prepared, and when, as in the present case, the subject is simple. But the method of the *perspective plan* is more convenient for designing in perspective, or for making a perspective drawing, as often has to be done, from mere sketches. It takes up less room, in the vertical direction; it is less laborious, though requiring perhaps more knowledge and skill; and it has the advantage previously pointed out, that it enables the position of points at different levels to be separately determined, by the use of separate perspective plans, and enables several successive drawings to be made, if necessary, without repeating the bulk of the labor, since the perspective plan can be made on a separate piece of paper, and used more than once.

Moreover, the points established on a perspective plan explain themselves: it is clear at a glance, and after any lapse of time, which denotes the door, which the window. In working by direct projection from the orthographic plan, on the contrary, it is almost impossible to remember which point is which, and much labor is caused by this confusion.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

The regular monthly meeting of this Chapter was held on Friday evening, March 1, the President in the chair.

Messrs. Longfellow and Peabody were appointed a committee to audit the Treasurer's accounts.

The committee appointed with power to take action for the Society with reference to the proposed completion of the Washington Monument at the national capital, reported that they had prepared and despatched the following letter:—

Boston, Feb. 28, 1878.

Hon. Henry L. Dawes,

Chairman of the Senate Committee on Public Buildings and Grounds.

Sir,—The Boston Chapter of the American Institute of Architects take the liberty of addressing you, and through you the committee of which you are chairman, in regard to the Washington Monument.

It is understood that there is now before the Committee on Public Buildings and Grounds, a bill to authorize the use of the appropriation voted by Congress last year, in strengthening the foundations of the monument, and that without such authorization, in consequence of the report of the United States commission on the condition of the monument, the appropriation cannot be so used.

In view of the responsibility which thus rests on the committee, we venture to call your attention to some considerations which seem to us important.

The official discussions on the appropriation of money for the monument have been chiefly confined to the question of its security; the question of its propriety, which if not more urgent is at least prevalent, has been until very lately entirely overlooked.

The design was adopted before the progress in art began which has distinguished the last generation of Americans, and when the artistic resources of the country were slender. It was apparently selected with

little consideration, we believe also with little general approval. The work, originally a private undertaking, has been interrupted for many years, until it is now proposed that Congress, which has many times declared its own intention of building a monument to Washington, shall assume the burden of its expense, and the greater responsibility of presenting it to the world as its choice.

We believe that we represent the general judgment of our profession and of the great body of artists throughout the country, whose judgment on such a question should be of value, when we say that if the structure is finished according to the published drawings, it will be altogether unworthy of its purpose.

A national monument to Washington is the most important monumental undertaking which has been begun in the United States, and, when it is to be built out of the resources of the country, becomes the concern of all its citizens.

To make a mistake in it will be a conspicuous and irretrievable misfortune, for once built there is no probability that it will ever be replaced.

We would earnestly suggest, therefore, that this questionable work should not be adopted and the responsibility for it accepted by the government, in the face of what we believe to be the general disapproval of persons who have studied the question of its design, and the general indifference at least of the public at large, without a serious inquiry whether the proposed form is the best for the monument, and is worthy of its object; and whether, if the present structure is retained, it cannot be turned to some more suitable form than is now intended; otherwise we believe it is right that the government should decline to lend its hand to it.

Very respectfully,
THE BOSTON SOCIETY OF ARCHITECTS,
By their committee,

(Signed) EDW. C. CABOT, *President.*
JOHN H. STURGIS, *Vice-President.*
HENRY VAN BRUNT, *Secretary.*
W. P. P. LONGFELLOW.

A report was then laid before the Society from the committee to which was referred the application made on behalf of Mr. J. T. Clarke, junior member of the Chapter, for assistance in enabling him to make some original researches among the unedited remains of the Doric order, chiefly in Sicily, Corfu, and the islands of the Greek Archipelago, with a view to their publication under the patronage of the Professor of the History of Art at Harvard University. This report commended the enterprise, and for its furtherance proposed the appropriation of $300 or $400 out of the funds of the Society now in the hands of the Treasurer. At a late hour, after a long and animated discussion on this subject, the meeting adjourned, to meet at the office of the President at noon on the 7th of March, when the matter will be finally disposed of.

CORRESPONDENCE.

A COLLEGE SOCIETY BUILDING. — THE NEW POST OFFICE BUILDING.

HARTFORD, CONN.

A NEW phase of architectural work has recently been developed in this city, by the erection of a college secret-society building. Designs of this character are new to Hartford. In the present instance, the building is due in part to the late action of the authorities in placing the new Trinity College buildings at a distance from the heart of the city.

The building — or "hall," or "lodge," or whatever it may technically be styled — is from designs by Mr. J. Cleveland Cady of New York, a former member of the college, and a "brother" of the organization which is the first of the several societies in the institution to build itself a lodge. The building stands upon a high bluff, a few rods north of the boundary-line of the college property, and commands from any of its sides an extensive reach of country, being at the same time a particularly prominent object from the railroads entering the city on the west. It faces the street which runs along the ridge, and extends back fifty-six feet, presenting a frontage of twenty-nine feet, with an extension on the south containing a vestibule with entrance-hall beyond. It has two stories with a high basement, the water-table being six feet from the ground. On the north side a circular tower, thirteen feet in diameter, rises seventy feet, and is embellished with a chimney corbelled out and built at an awkward angle. The chimney breaks the lines of the tower-cornice, and is carried up less than half the height of the roof, and capped by graduated capstones; the escapes for smoke being arched openings in the four faces. The material of the building is New Hampshire granite. This is laid up in regular courses with rock-face, while the water-table, the bands, string-courses, etc., are of the same stone, axed. It stands upon natural rock, and is underpinned with a brick wall two feet thick.

The architect has taken a wide departure from the stereotyped rules which, by a sort of tacit consent, seemed to govern the construction of many of the early society buildings at the older colleges in the country, and has done away with that tomb-like expression which was thought to be part and parcel of a good and appropriate design for such a building. Instead, we have numerous windows of ample dimensions, a modest gable, high-pitched roofs, a lofty tower, a prominent entrance, and, at various points, some bad carving. The whole study is a happy example of the value of careful design in any building, great or small. The front of the lodge is apsidal, and affords within an octagonal apartment; the exterior walls finding their counterparts in the interior brick partitions, in one of which is a roomy fireplace; the corresponding angle-wall of the apartment on the ground-floor containing the entrance-doors opening from the hall in the extension, or wing. From this hall a passage-way, extending the width of the main building, connects directly with the staircase-tower. The rear room on the ground-floor has two of its angle-walls treated like those of the octagonal room; and this portion of the building externally is marked by a very wide opening under a segmental arch filled with a series of wooden-mullioned windows. The roof is double-framed, hipped, finished with iron cresting or ridge-tile. The extremities of the ridge bear enormous finials six or eight feet high, embellished with rosettes. A symbolic piece of design — the "*crux ansata*," or the Egyptian symbol of life — is placed upon the stem of the finial, and has both its faces highly gilded. The effect of the roof-finish on the tower is most excellent; but the same criticism can hardly apply to the finials on the main building.

The extension or wing on the south of the lodge presents a gable, finished with a coping and roughly-wrought finial; the main walls being pierced by two pointed windows with a circular window above. The three angle-walls of the front of the building have each upon the ground-floor double windows of ample dimensions, whose tympana show specimens of symbolic carving which are subjects for comment, even if the windows themselves are not open to criticism. Like many others of smaller dimensions on this floor, they suggest the old question, Shall pointed arches be finished with a keystone, after the manner of classic work, or with a joint at the vertex? Mr. Cady adopts the former method in this instance, while but a short distance off is an example of the latter treatment, in the pointed windows and doorways in the new college buildings. The lodge-windows on the first floor are arranged in groups of three, the width of a single window not exceeding ten inches; the heads are trefoiled, and the jambs slightly splayed. The tower-windows are narrow, and follow the rake of the stairs, with the exception of the upper ones, which are at a level, and afford a view in all directions. The building will be finished in hard woods, and, when completed, will cost more than $30,000.

It has been rumored that the new Cheney block, built in this city from plans by Messrs. Cambrill and Richardson, and described in a former letter, is to undergo some alterations next season. The square tower, forming the prominent feature upon the principal corner of the block, now finishes at a slight distance above the main building, by a pyramidal roof, conspicuously covered with red tile. This roof, it is said, will be removed, and the walls of the tower carried up. The change will unquestionably enhance the architectural effect of the building, which is now one of the finest in Hartford, as well as one of the costliest.

The new post-office in this city was bravely begun, is now partially finished, and will be completed in the near future, if the present bill before Congress asking for an appropriation of $240,000, is passed. The post-office is irregular in outline, the length being 112 feet and the width about 100 feet. The material used is granite from the quarries at Clark's Island, where the stone is cut to measurement and forwarded. The building was one of those designed by Mr. Mullett. It is severely classic in detail, and is crowned by a roof of the orthodox style, two large towers serving to break up any chance of monotony of roof-lines. The work has been under the able superintendence of Mr. G. H. Gilbert, a local architect; and the building had been carried up to the first floor, when it was covered over, although immense quantities of stone were on the site, ready to be unboxed and put in place; but this was an impossible step, as appropriations had been exhausted. The post-office is centrally located, and occupies a prominent angle on what is known as "State House Square," directly behind the time-honored building in which for so many years the Connecticut Legislature has met, and which is soon to be deserted for the more commodious and elegant quarters in the Capitol on Bushnell Park. Already three appropriations have been made for the post-office; but of the large sums granted less than $150,000 have been expended in Hartford.

CHESTWOOD.

SPALLING OF BRICKS.

ST. LOUIS, March 1, 1878.

EDITOR AMERICAN ARCHITECT.

Dear Sir, — Your Cincinnati correspondent explains the cracking and spalling which he reports in the stock-brick facing of the walls of the new Shillito Building in that city, by the hypothesis that the backing of common brick must have settled more than the stock-brick, because of the greater thickness of the mortar-joints in the backing. This explanation hardly seems satisfactory in view of the facts that in this city, as doubtless in most others, it has long been the almost universal practice to back up stock-bricks laid with a very fine joint, with smaller common bricks laid with a much thicker mortar-joint; that such buildings have stood for many years, and that we have yet to learn of a case in which the stock-brick has cracked and spalled as reported at Cincinnati.

One is tempted to question the quality of the stock-bricks used in the Shillito Building, or of the manner in which they were laid. A well-known cause of spalling in new bricks is the presence of

limestone pebbles in the brick-clay, which are converted into caustic lime by the process of burning, and then, expanding on exposure to moisture, burst and spall off the face of the brick.

Very respectfully yours,

C. E. Illsley.

BUILDING IN KANSAS.

The dug-out is the primitive house of Kansas. In Minnesota, at an early day, a dug-out meant an Indian canoe hollowed out of the trunk of a tree. In Kansas it means a habitation for a new settler. Its name is indicative of its construction. An excavation is made to about five feet below the surface, and large enough to furnish the requisite room for the family. Usually it is located at the edge of a ravine or depression, so that the approach can incline from instead of to the entrance. In other cases, it is dug on level ground, — the entrance descending four or five steps, as in entering a basement. The walls above the surface of the earth are built up of stones or sods to the requisite height of ceiling, and banked up by the earth dug out. The windows are necessarily above ground, which makes them high from the inside, and pretty low from the outside. The roof is given a sufficient inclination or pitch; covered with one thickness of common boards or poles, and above that with earth packed down so smooth and solid that no water will penetrate it. The sides are so solid and firm that they can be whitewashed or plastered, as is sometimes done by the extra fastidious, — some even going to the extravagance of a brown muslin ceiling tacked to the under side of the roof-timbers, and whitewashed. Where these extravagant ideas do not enter into the construction of a dug-out, one with one room, say sixteen by twenty feet, can be built with a cash outlay for lumber, nails, and windows, of about twenty-five dollars, — the owner doing all the labor himself. Other rooms can be added as needed, though the resident of a dug-out usually has aspirations for a more imposing residence, and expends no more on these temporary structures than absolutely necessary. The dug-out furnishes a cheap and really comfortable cabin for the new settler of small means, — being warm in winter and cool in summer, rarely if ever damp; and hundreds of intelligent, well-educated, Eastern-raised people are to-day living in them, improving their farms, and increasing their live stock, — who in a few years will build comfortable houses, and surround themselves and their families with all the comforts and conveniences of life. The sod-house is another style of cheap house. This is made by running a breaking-plough about three or four inches deep, till a sufficient amount of material has been turned over, when it is cut into convenient lengths with a spade, hauled to the building-site, and laid up in walls like stone, only requiring no mortar. The door and window frames are set and built in the same as in a brick or stone house. When the walls have reached a sufficient height, a plank is laid on each side for a plate, and to this the bottom of the rafters are spiked. The gables are built up under the end-rafters, of the same material as the rest of the walls. The roof is made in the same manner as that of the dug-out, care being taken to have it properly supported in the centre. High-toned people trim the walls down smooth, and plaster them outside and in, which makes a very respectable-appearing as well as comfortable house. The cash outlay for a sod-house is about the same as for a dug-out. Concrete probably furnishes the cheapest material from which to construct a house of a permanent character, since all the materials requisite for the walls, except the small quantity of cement required, are found in abundance; and in their construction no special mechanical skill is required, so that the settler of ordinary intelligence can mainly build his own house. The process of building concrete walls has been so often published, that it is not necessary to now give it in detail. Brick have been but little used, because stone is so abundant and is cheaper. — *Letter to the Chicago Tribune.*

NOTES AND CLIPPINGS.

Reredos. — A new reredos is building for Grace Church, New York, which will cost about $30,000. The altar of white marble, with eight red marble columns surmounted with white foliated capitals, will be twenty-five feet long. The reredos will be twenty-one feet high, and Gothic in style. The front of the altar will be divided into three panels, which will be richly inlaid with colored marbles. The base will be of green Genoa marble, and the columns on either side of it will be inlaid with Sienna and black marble. The cornice will be of carved marble of a dove-color, and above it will be a heavy string and sill course supporting the panels of the reredos. The institution of the sacrament will be represented in mosaic on the central panel, and on either side will be figures of two of the four Evangelists. All the panels will be surrounded with tracery, and the buttresses will be surmounted by white pinnacles with columns of Mexican onyx.

A Singular Phenomenon recently happened at La Clappe, in France. A plat of ground planted with vines and olive-trees slowly sank in and disappeared, leaving a gulf of a funnel-shaped form about 120 feet in diameter at the surface and 40 feet at the bottom. At the depth of 100 feet may be seen a sheet of water, in which the earth, estimated at a quantity of 10,000 cubic yards, has been swallowed up.

The Light-House at Atlantic City. — We mentioned in our first volume that the authorities were taking measures to preserve the light-house at this point from being undermined by the action of the tides. Cribs were built outside, but were washed away, and the tides have been crawling steadily inland. In 1857 the light-house was 1,300 feet beyond low-water mark: now it is only one hundred feet beyond it, so that the water washes about its base, and is slowly undermining it so that its fall may happen at any time. The light-house is 170 feet high, and marks one of the most dangerous points on the New Jersey shore, where, in spite of it, many vessels have been wrecked of late.

Railroad Bridges. — A writer in *Engineering News* thus classifies the causes of 183 bridge accidents that have occurred in the United States and Canada since 1872, which he has been able to investigate. Accidents have befallen 57 pile or trestle bridges, 38 Howe truss bridges, 5 combination bridges, 17 iron bridges, and 66 bridges whose construction is indeterminate. The following causes are assigned: fire, 6; hurricane, 3; freshet, 26; undergoing repairs, 7; floor broken by train, 27; bridge knocked down by train, 51; square fall, i.e., lack of strength to support the weight of a train, 8; unknown, 52.

Sipontum. — As was recorded by a notice in No. 106 of the *American Architect*, Sipontum, another subterranean city, another Pompeii, is being disentombed in Southern Italy. It was discovered while cleaning a well, situated not far from Monte Gargano, in Apulia, on the Adriatic coast. The building first struck upon was a temple, apparently dedicated to Diana; then followed the long *porticus*, and an extensive necropolis has very recently been unearthed which is said to cover not less than four acres. Many important inscriptions have already been brought to light here, most of which luckily find their way to the National Museum at Naples. The extensive excavations receive the full support of the citizens and the archbishop of Manfredonia, which latter city, one of those founded by the son of Frederic the Second, is built in part over the remains of the antique Sipontum, exactly as Dr. Schliemann found one town superimposed upon the yet existing remains of another at Hissarlik. Sipontum was originally a Greek colony, the foundation of which is of uncertain date. It was old when the Romans resettled all that country after the second Punic war. The name of the place then was Sipon, given to it, most likely, from the cuttle-fish (sepia) cast up on the neighboring shore; from this the later Romans formed Sipontum in the same way as Tarentum, Hydruntum, etc. Sipontum, like other Apulian cities, never recovered from the awful devastations of the Punic war; still it managed to preserve its existence, while other ancient cities were disappearing so thoroughly that no tradition lingers even of their site. By the middle of the thirteenth century it was considered very unhealthy on account of its sunken position, and the marshes by which it was surrounded, the effect doubtless of the depression of the ground which had already taken place; so in 1251 King Manfred transferred its population to a new town, which he built in a higher and more healthy situation. Thenceforth old Sipontum was deserted, and handed over to the earthquakes, which seem to have dealt with it tenderly; not rudely shaking it into ruin, but wrapping it in clay and tufa sand so effectively as to hide it away for six centuries. Many relics have been found in the houses; but the city of the dead, with its immense number of tombs, promises to be the most fruitful field for research. Sipontum is generally associated in one's mind with its neighbors Apina and Trica, towns lying near by, whose names (*Apina et Trica*), since their destruction by Diomede, have become proverbial for nothingness. Let us hope that Sipontum will not prove thus empty. Even though the matter may not be so momentous as it is represented by the Italian journals, we may still expect from this discovery important additions to our knowledge of Roman antiquities and civilization.

An Elevator Accident. — Elevators seem to be as productive of accidents as stairs; for as it is as possible to tumble up stairs as to tumble down stairs, so one cooped up in an elevator can vary the excitement of a breathless drop through four or five stories, by taking an equally breathless flight through the same space, and finish as fatally in the second case as in the first; this was the case in Paris, where, a short time ago, three persons were carried from the bottom of the elevator-shaft in the Grand Hôtel Paris, and crushed against the ceiling. The accident was caused by the loss of the balance.

A Loan Exhibition. — The Woman's Art Museum Association of Cincinnati have decided to hold during the month of May a loan collection exhibition, Mr. John Cochnower having generously tendered the use of his house (now unoccupied), No. 166 West Seventh Street, for that purpose. The objects desired for exhibition are bronzes, mosaics, ancient armor, carved ivories, gold, silver, and brass work, enamelled metals and porcelain, antique furniture, pottery, artistic embroideries, pictures, engravings, statuary, glass, lace, tapestry, wood-carvings, etc. As it is well known that Cincinnati is rich with articles above mentioned, with others of like nature, the exhibition will no doubt be one of great interest.

The Florentine Water-Works. — Among the most important enterprises of modern Italian engineering, are the new water-works of Florence. The object of the undertaking is thus stated in *Giornale del Genio Civile:* "To collect in a gallery, excavated near the city, the subterranean waters which filter through the sand and gravel which form the subsoil of the great valley of the Arno; to convey them into ample basins, from which, by means of powerful pumps, they may be distributed in canals, using the water of the Arno and Corliss steam-engines for motive force; and to establish ample reservoirs, above the level of the city, to receive the excess or supply the deficiency of hourly consumption, the reservoirs acting like the governors of a steam-engine."

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IT is some years since a competition was held for designs for a new Congressional Library, — a competition which resulted in nothing but the awarding of two or three premiums for preferred designs, — and it may be believed that the need which was then felt is now more imperative. The librarian of Congress, Mr. Spofford, has kept it before Congress by successive recommendations in his annual reports, and in his last reminded them that the accumulation of a hundred thousand volumes since the need was first felt was crowding the library to such a degree as to greatly impair its usefulness. To this difficulty is to be added the insecurity of the books in their present position, to which we not long ago called attention. The United States Senate has lately passed a bill, which is now before the House, appointing a commission, and authorizing an appropriation, to provide plans for a new building or an extension. There are now in the library over three hundred and thirty thousand volumes, and a third as many pamphlets, a great part of which is rubbish, to be sure, owing to the law which compels it to receive two copies of every book published in the country. The same provision which has swollen it so fast hitherto will, it has been computed, in the course of this century require for it a building two-thirds as large as the present Capitol. This ought to be reason enough for rejecting one of the schemes proposed, — that the central part of the Capitol be extended to furnish room for the library. It is desirable that in due time the centre building should be modified into unity of design with the wings, and plans for this were prepared long ago by the architect of the wings. But it is likely that there will always be use enough for all the space that can be added without injury to the effect of the building; while it is not likely that, even if some means is devised to keep down the rising flood of literature, any space that could be so provided would be permanently sufficient for the needs of a library which will far outstrip all others in the country. Moreover, in spite of the convenience of having the books close at hand and under one roof with the halls of Congress, a library is a thing that more than most demands imperatively, for its well-being and security, a building of its own, isolated from all other uses. The difficulty of separation might doubtless be substantially relieved by providing a working library of the more essential publications, for which there would be room enough in the Capitol, and which might consist of duplicates. Another proposition is to build a new library on Judiciary Square, where the old City Hall is, a situation inconveniently far from the Capitol, we should think. Still another is to build it on ground east of the Capitol, which promises better. It has been suggested, we understand, that in this case it may still be a building of divided uses; but this again would be a serious mistake. However it is done, we trust it will not be in any half-way manner. A library brooks no rival; and a building that is well planned for it, cannot be well planned for any thing else.

IT is said that the so-called Advisory Committee for the selection of American paintings to be sent to the Paris Exhibition has after considerable labor made its final choice among a large number of pictures that were offered. About eighty have been accepted, mostly the work of New York artists, there being only three from Philadelphia and five from Boston. It is not reported that pictures have been received from any other cities. Of the whole number accepted a dozen are water-colors. The contributions of American artists who are abroad are expected to add some twenty-five more to the display; and of these it is rumored that the greater part will come from Rome, — a thing which was hardly to be looked for, considering that the strongest colony of American painters has generally been at Paris, where the exhibition is to be, and considering also the prominence of the Munich colony of late.

THE Trustees of the Boston Museum of Fine Arts have published their second annual report, which gives an encouraging account of its administration and success. The Museum was open to the public on every day in 1877 except in August, when it was closed for alterations. Lately it has been free to the public on Sunday afternoons; and the average of visitors has been nearly as great on Sunday as on Saturday, the other free day. The whole number of visitors during the year was nearly one hundred and sixty thousand. Of these of course by far the greater number were on the free days, when the average was about fifteen hundred. It appeared, however, that the number of visitors on the paying days, which was only sixty-three, increased in spite of the addition of Sundays to the free days. It is clear from the experience of this and the Philadelphia Museum, which we mentioned last week, and of the Metropolitan Museum in New York, that the establishment of these means of general cultivation has not been in advance of the popular demand for them. The report of the committee on the Museum dwells with reasonable emphasis on the importance to its usefulness of the School of Drawing and Painting, which, though independently organized, has been given house-room and the use of the collections by the trustees, and for which two additional rooms have been fitted up in the past year. To the students in this school are to be added the architectural students in the Institute of Technology and the pupils of the Free School of Design at the Lowell Institute, to all of whom free access to the collections is given. The report shows that the principal running expenses are pretty evenly balanced by the current receipts; the sale of the catalogues meeting the cost of issuing them, and a trifle more; the receipts from admissions balancing the pay of the attendants; and the income from investments paying the salaries of officers and the cost of heating and lighting, and giving a small surplus for the purchase of works of art. This assures the Museum of its own maintenance, but leaves its accretions to be chiefly the result of individual contributions. These are not lacking, and already the complaint is of want of room to display the collections. This want has grown so pressing, that a subscription has been opened with the hope of raising a hundred thousand dollars to build the remainder of the front wing of the building, — the part now built being only a fraction of the complete design. Of this sum nearly ninety thousand had been raised at the last accounts, and there was little doubt that the work would be begun the coming summer.

AT a recent distribution of prizes at the Sheffield School of Art, Mr. Barry, the President of the Royal Institute of British Architects, made a criticism which it would be well to repeat often, for the present at least, wherever there are schools of drawing of any serious purpose. He spoke with surprise and regret of the very small number of pupils in the school, a large one, who attended the class for the study of the human figure. This study, he said, was not only the highest branch of art, but by far the most useful, and the knowledge of it would do more than any thing to keep alive and vigorous the other branches of drawing and modelling. As an instance he mentioned the effect of it among the French as "seen in the broad, decisive and vigorous way in which they handled ornamentation of all sorts," — we should add, in the refinement and grace of their work.

The school in Glasgow is one of the old schools of art in England, having been founded by the efforts of the painter Haydon and a few others in 1843, before the "World's Fair" gave the impulse to the study of design which resulted in the South Kensington movement. The strength of the undertaking and the need it met may be inferred from the fact that in this town of Sheffield, a town smaller than Boston, given over more than any other to the condition of a purely manufacturing community, and to the deteriorating influences of trades-unionism, the number of scholars in the school of art has grown to nearly four hundred. Glasgow is a yet more striking instance of the popularity of such a school, where in a community of about six hundred thousand there are in a similar one thirteen hundred students. These are good examples for the manufacturing communities here. There is less to encourage in the fact that Mr. Barry should have found among the four hundred students at Sheffield only five or six who attended the classes for the study of the figure.

Mr. Barry here proclaimed an important and a much-neglected truth. There is no royal road to design, but that which comes nearest to it lies through the study of the figure. It is, of course, difficult for those who have not pursued the study to realize the increase of power which it gives, as it is for a near-sighted man to know how things will look to him through spectacles before he has tried them. Nevertheless it is true, and all experience shows it, that no other training gives the same power of line, and of composition, or so favors that directness, decision, and subtle unity of effect which we call style, and which is so wanting in most modern work. It is pretty safe to say that no one can be a great designer who has not learned to draw the figure. The study of other organic forms — flowers, plants, and trees — such as has been more common of late, is the next best thing, but distinctly inferior as a means of training. In all the great ages of design, and among almost all nations that were skilled in it, the study of the figure has been predominant. The only exceptions of mark are in Indian and Saracenic work, which, admirable as it is in its kind, by reason of the natural aptitude of those who wrought it, is yet on a lower plane than the rest. It was at the foundation of Egyptian and Greek design, and the Roman owed to it what excellence it had. All the beautiful ornamental design of the early Renaissance was the work of artists whose main study was to paint and carve the figure. Even in the thirteenth century, the golden age of Gothic architecture, though the common reliance was on other organic forms, the figure was always essential in any considerable work, and the sculpture of it had reached a point of excellence for which we too often forget to give it credit. In our day the French designers owe, as Mr. Barry intimates, their unrestricted superiority, at least in skill, to their familiarity with it. Yet in our country there are but two or three schools where serious attention is paid to it, in spite of the great enthusiasm for all sorts of design which has sprung up. This is due probably to the fact that the study is exacting, and we are impatient of rigorous training; also, that it naturally comes last in a draughtsman's training, and that we are in haste to put an end to this training early, as to all others. But the neglect is none the less a serious shortcoming, and ought not to continue.

It has been a standing illustration of the impossibilities which architects were called on to accomplish, to say that their clients expected them to put a quart into a pint pot. It would appear that a way of accomplishing this, or something very like it, has been discovered in Boston. Some time ago the mayor of that city sent a special message to the city government, calling their attention to the urgent need of a new court-house, a need which has long been felt and argued, and recommending that it be put on a lot on Beacon Hill, now occupied by a disused reservoir, and extended by the purchase of adjacent land. The Aldermen's Committee on County Buildings, to whom the mayor's message was referred, has reported that this proposal is too expensive, since besides the cost of the additional land, which they set at $214,000, the city architect, they say, estimates the cost of a new court-house upon it at $1,200,000. The committee therefore proposes an economical alternative. It would divide the courts, which are now crowded into one building, and build a new criminal court-house in the yard of the jail; then pull away the present court-house, and build a new one on its site for the civil courts alone. By this, not only would the county be saved the expense of buying new ground, which is an intelligible economy, but there would be a still greater saving in building; for according to plans prepared by the city architect, says the committee, two new court-houses can be built for $500,000, which will accommodate all the courts and have eighteen rooms left over for the use of the City Hall, while, as we have seen, to build one will cost more than a million, — that is to say, two court-houses are cheaper by half than one. Unless there is some mistake in the figures, there is great ingenuity somewhere; and an economical committee may well plume itself upon it. Nevertheless it is perhaps not well to commit the county too hastily to the duplex court-house, lest it should be discovered that by subdividing the civil courts and occupying part of the Common three new court-houses could be built for three hundred thousand dollars, and perhaps have a whole one left over, which would be a yet more shining economy.

Mr. Charles H. Moore writes to the *Nation*, concerning the care of public monuments in Europe, to say that he has lately seen the south transept of the Cathedral at Florence covered with scaffolding "for the purpose of carrying on one of the most foolish and destructive processes of so-called restoration, — that, namely, of scouring off with strong acids all the old weather-stain, the golden color of ages; of picking out and replacing with new all cracked or broken fragments of mosaic; and of *tooling over the old sculpture.*" And again: "I found the delicate capitals of the window-shafts entirely unprotected, and freshly broken in many places by chips which the workmen had let fall upon them from above. The exquisite gable-crockets — originally most wonderful for subtle carving of undulating surface, and spring of curvature — were ruthlessly hacked over and spoiled. I have ascertained that the intention is to go completely over the Cathedral in this manner, in order to make the old work look fresh and match the new façade now in progress." This is a kind of barbarism by which the traveller in Italy and even in France is frequently shocked. Aside from the beauty of the work which is thus attacked, there is here a peculiar cruelty in this treatment of the material. It is a characteristic of many of the buildings of Tuscany, due probably to the marble of which they are built, that they acquire with time a rich saffron tint, the "golden color of ages" of which Mr. Moore speaks. This color, of which the cathedrals at Florence and Pisa are conspicuous examples, is hardly found elsewhere, not even, we believe, in the intermediate towns of Lucca and Pistoia, and is very different from the gray and blackish staining which occurs in other cities, in Venice, for instance. The annoyance of the visitor at seeing these two cathedrals spotted over in glaring white where stones had been replaced has been softened by the feeling that in due time the new material would grow into harmony with the old, and his natural inclination would have been to hasten the process by a slight stain on the new stones: there are few, we fancy, to whom it would have occurred to do it by scouring the old. As for the new façade, whose place in the general esteem is yet to be determined, most persons would have expected to wait patiently for it to adjust itself to the rest. Not many except its builders would, it is to be hoped, have thought of adjusting the venerable cathedral to it.

URBAN HOUSING IN NEW YORK.—I.

THE INFLUENCE OF THE SIZE OF CITY LOTS.

As New York lies, it would probably be impossible to invent a system of tenement-houses, unless built with no windows at all, more perfectly adapted than is the present to deprive the homes of the poor of light, air, sunshine, and ventilation. The question has often been asked, "Can nothing be done to lessen the evils of tenement-houses in our large cities?" Can nothing be done, for example, to get air and light into the sleeping-places of those who live in such houses? Is there no way of getting a window into every bedroom, or must the majority of the bedrooms of the poor be always, as now, dark and unventilated? Perhaps every day this question is now asked not by one only, but by a large and ever-increasing number among those who suffer, or see others suffer, under the evils and wretchedness resulting from the present

system. No satisfactory answer to this question seems ever to have been made. Yet of its importance there can be no question. The evils are acknowledged; the need of remedy is urgent. It is my aim in these papers to show that this question, though it has long remained unanswered, is not unanswerable; but that, on the contrary, there is an answer ready, and a most satisfactory one.

It is common to attribute the evils of New York tenement-houses to overcrowding consequent on the limited size of the island on which New York is built. This notion is so generally accepted, as to make the tracing of the causes of these evils backward, step by step, seem useless study. In giving attention to tenement-house plans, and in endeavoring to find their chief evils, and then to find the immediate and direct cause of each evil, and so, without preconceived notions, to trace the chain of evils backward, I found myself led in quite a different direction. There seems to be a more immediate cause for these evils than the size of the island, and one happily not beyond human control. I found in the imposition by the city of artificial restrictions on the distribution of areas and sale of real estate that which has immediately brought about these evils in New York, and would bring about the same results in however large a space. And I find that these restrictions, where they have been imposed in inland cities, have led to results identical with those we deplore in New York.

The peculiar evils of the tenement-house system of the upper part of New York are not due to the limited size or narrow width of the island on which New York is built, as is generally supposed, nor are they due to overcrowding, but to the inflexible depth of 100 feet each of the up-town lots. The whole of New York above Fourteenth Street, that is to say four-fifths of the island or more, is laid out in lots all of one uniform depth. These lots are about 100 feet deep each. This is much larger than persons of moderate means can afford to build on. A shallow house would not pay on such a deep lot. By consequence, only very deep houses are built, in which only the rich can afford to live with comfort; in which people of moderate means cannot live with economy; and which, for the very poor, and even for mechanics and artisans, become tenement-houses of a sort which can be lived in with neither comfort, true economy, nor decency.

This is the Juggernaut under the pressure of which New York is fast becoming a city of only the very rich and the very poor; a city where only the very rich live in comfort, and where those of moderate or limited means are driven, if they remain in the city at all, into boarding-houses, in the best of which many have to sleep in inside unventilated rooms. It has thus became a city which discourages marriage, and where it is impossible for the young of the better classes to marry and go to housekeeping without a provision far beyond that required in any other city on the continent, or probably in the world. It has become a city where mechanics and artisans, as well as day-laborers and abject poor, are herded in tenement-houses where nine-tenths of the bedrooms are darkened and unventilated. It has become a city where manufactures do not, as in Philadelphia (where operatives, mechanics, artisans, and the like are happier, more respectable, more respected, because better housed, than anywhere else in the world), readily take the place of a departing or expiring trade.

Imagine a city where official blundering had resulted in making it impossible to buy flour or sugar or any other staple in parcels of either less or more than a hundred pounds, or cloth or textile fabrics of any width except in pieces of ten yards' length, and one will be able to form some idea of the absurdity of the system at present prevailing in New York, and which governs all dealings in real estate almost entirely throughout the upper, and by far the larger, part of the city.

In Philadelphia the way in which the large squares are subdivided by lesser streets, and the blocks so remaining are again and again subdivided, makes it possible to buy pieces of land of an infinite variety of size and situation and shape and price. In consequence of this principally, — for the city is shut in between two rivers, much like New York, — Philadelphia has become the paradise of mechanics and operatives. The number of persons who are owners of real estate there is thus enormous in proportion to the amount of real estate owned. This makes a vast number of citizens in proportion to the population of the city, who, though people of small means, are yet owners of real estate, and who thus have a stake in the community, and are members of that class, the existence of which most conduces to the safety and perpetuity of the state.

The same would be, in a much greater measure than now, the case in New York if lots of smaller size were procurable in fee simple, or on ground rent. And this would be the case whether the houses built upon them were intended for one or several families. An owner of a small piece of real estate has the same interest in the conservation of civil order, whether his property is occupied by himself only or by a dozen other families. But the smaller the size of such pieces of real estate, the larger will be the number of holders. And not only this, but the better and more comfortable will be the houses upon them for however many intended. Can any thing be worse than the majority of the so-called French flats which have become common in the upper part of the city, but which in Paris would not be allowed by law? They have, some of them, more dark, unventilated bedrooms than perhaps the worst of our tenement-houses. Nor can this well be avoided where such a house is built upon a lot one hundred feet deep, and but twenty-five feet, or perhaps less, in breadth, and where the only light and air to be had is on the narrow ends of the house, or by wells of light which are adapted to disseminate a pestilence through a house, but not to allow it to escape.

Would it not be well for owners of real estate to consider whether it would be to their advantage to run short streets through their property, from north to south, say of the width of Jauncey Court, and furnished like that with gates at the ends, which can be often enough closed to retain a property-right in the street? Such a street, like a *cité* in Paris, could be lighted and kept in order and policed by the city, and the lots along its sides could be of such shallow depth as might be found convenient for those desiring lots shallower than the customary depth in the city. Such lots could be leased on ground rent like the lots of Columbia College, the Sailors' Snug Harbor, etc. Would it not be well for those in charge of the interests of the institutions just named, and others like them, to consider whether, by acting on this suggestion, they would not be introducing a reform which would, in the end, become a benefit to all classes? Again, in planning flats, tenement-houses, and the like, would it not be well to plan them as shallow buildings, or blocks run through from street to street, giving light and air to every room of each flat or tenement, and divided from one another by such streets as above described?

Many attempts have been made to overcome the evils which have gradually arisen out of the New York deep lot system. But of those attempts, either those which have been carried out, or those which have only been recommended, I cannot find one which, if it accepts the present New York street-lot system, then effectually overcomes the evils growing out of it. When such attempts are meant to serve the tenement-house population by the planning or building of model tenement-houses, such houses either embody the usual tenement-house evils, or avoid them by means which are not of general application. They either have dark, unventilated inside rooms, or they avoid them by building on a corner lot. But these dark, unventilated, windowless inside rooms are the worst feature of New York tenement-houses, and are without parallel in any other country; and the New York up-town blocks contain each from forty to sixty city lots of which only four are corner lots. Buildings, or plans for buildings, however well meant, which embody the evils they should aim to avoid, or which avoid them by means not of general applicability, are not, and cannot be models.

Those who have or would enter upon such enterprises, and in proportion as their motives are high and unselfish, should take care not to be misled into supposing that excellence of their plans is proved by any financial success whether brief or lasting, which such enterprises, where put into execution, may have. Financial success does not argue excellence of plan. The worst tenement-houses in New York are financial successes. Nor again does the fact that the poor desert the old tenement-houses, and crowd into the new model tenement-houses, prove any excellence of plan in the latter. From what I can learn, all old houses, on whatever plan, bad or *good*, will be deserted by tenants for new houses on whatever plan, whether good or bad. And all new houses (whether like Sir Sidney Waterlow's for instance, or better or worse) will, unless they cost too much, have a financial success, and a success otherwise in appearance for a time. Even conveniences of plan should not be confounded with excellence of plan in a sanitary point of view. A house may be well planned, or it may be ill planned, from a sanitary point of view, and yet be very convenient. The convenience may be the result of much study and forethought. It is in itself an excellence. But it is not a sanitary excellence. Convenience is frequently, and in the city of New York almost invariably, at variance with sanitary excellence. And in New York this is the case not only in tenement-houses but also in private houses, and especially and to a very reprehensible degree, in most of the new flats and apartment-houses. Nor again should constant attention, any more than newness and convenience, be mistaken for excellence of plan. Constant attention, like that of that London lady who lives among her tenants, and collects rents, and supervises generally herself, and like that of a noble-minded lady in one of our own cities, and like that of all who from motives of charity or interest give constant attention, will secure success in itself, or it will prolong a success owed partly to the newness or convenience of a house. But this is as much the case with bad as with good houses. With every new house at the start, special attention, and such as cannot be depended upon later, is almost sure to be given to the character and demeanor of tenants. But whether special attention arises from philanthropic or only self-interested considerations, it is, though most worthy and commendable in itself, still outside the province of plan, unless a constant factor, to be always counted on.

Newness, convenience, and special attention ought to bring a very high degree of success and financial prosperity to any building, however bad its plan from a sanitary point of view. And that success ought to continue as long as the newness and the special attention last, and there are tenants who can appreciate convenience. But with time, and the falling-off of such more or less temporary attention, the success gradually disappears. Less

active interest in the house or houses on the part of its owners, less close attention on the part of their agents, less careful tenants, less cleanly houses, reduced rents, etc., in turn and gradually follow. As nearly as I can learn, this is likely to be the case, whether the plan built on is good or bad.

What then is the plan that we should aim at? A good plan, the plan that is most needed, would seem to be that which would combine most economically the greatest sanitary excellence with convenience, and would depend least on newness and special attention for its success. I should consider a well-planned house or tenement that in which not only good people could live commendably and with most advantage to themselves, but one in which bad people could live badly with the least harm to themselves or others.

And in this connection we should bear in mind the difference between harm, and harm apparent, and not give our attention only and wholly to the latter. The main evils in bad plans are those of a sanitary nature, of which only experience and science have shown the danger; while minor evils, such as inconvenience, poor appearance, etc., are immediately apparent. The New York system of building is a remarkable one for hiding the evils which are inherent in it. Take for instance such a tenement-house as is not uncommon in New York. It is twenty-five feet wide, over seventy feet deep, and it has four families on a floor. It fronts well on a wide street; it has, say, a brown-stone front; it makes a good appearance, and commends itself to outsiders. Each tenement in such a house consists of several rooms. But only one of the rooms in each is properly lighted and ventilated; for the tenements in such a house have,

and, as will be seen from the diagram annexed, can have, windows, light, and air on but one of their four sides. The windows are on one of the narrow ends, and, as the tenements are three times as deep as they are wide, it will be seen that they are necessarily like cave-dwellings, dark and unventilated. If, in addition to such light as is received into the inner rooms by openings in the partitions dividing them from the outer room which has the windows, a sort of twilight gets into them also by means of wells of light as they are called in the body of the house, still these inside rooms are inadequately lighted. In most of them no bird would sing, no flower would bloom, no plant put forth green leaves. No human being can live in them except at a great sanitary disadvantage as to ventilation. Such wells of light, as before pointed out, are calculated to disseminate a pestilence through a house, but not to allow it to escape.

Yet, bad as such tenements are, most persons would prefer to hire one in such a house, rather than in an equally well-appearing house if it stood upon a narrow street or alley, even though the tenements of the latter possessed every sanitary excellence and were in every part well lighted and ventilated by windows opening on the street and yards. For the credit or discredit of living in a wide or narrow street is *immediately apparent*. But the evils of the system embodied in a 25 x 70 feet tenement-house with no thorough draughts of air, and no adequate ventilation or light except in one room of each series, are *not apparent*; they are concealed from outsiders wholly and always, and mostly from the occupants themselves, except in very hot weather. Few persons are very sensitive about bad air. It does not inconvenience them — at least, not much. Few persons will take much pains to avoid it, especially if such avoidance entails any other sacrifices or inconveniences along with it. Even among our wealthiest classes we have made our houses very convenient, but rather fever-breeding. We must expect that the poor, like the rich and the tolerably well-off, will prefer appearance and convenience, that first element of the luxury that we are all, and I suppose wisely, striving for, to any doubtful sanitary benefits.

But *if* we concede that (1) bad air is bad for the health, that (2) in inside rooms there will be bad air, that (3) the chances are that inside rooms will be frequently unventilated; and that (4) where a house is more than two rooms deep, and without windows on the sides, there must be one or more inside rooms in it; and if, further, we concede that (5) a house two rooms deep cannot be made much more than about thirty feet deep, with economy, for a race of five-to-six-feet-high people; and (6) if we only put one such house on a 25 x 100 feet lot, — *then*, it seems to me, that we must either be willing to let over two-thirds of our lot go unbuilt upon, or we *must* have *smaller lots*.

THE ILLUSTRATIONS.

THE WHITING BUILDING AND OPERA-HOUSE, HOLYOKE, MASS. MR. C. S. LUCE, ARCHITECT.

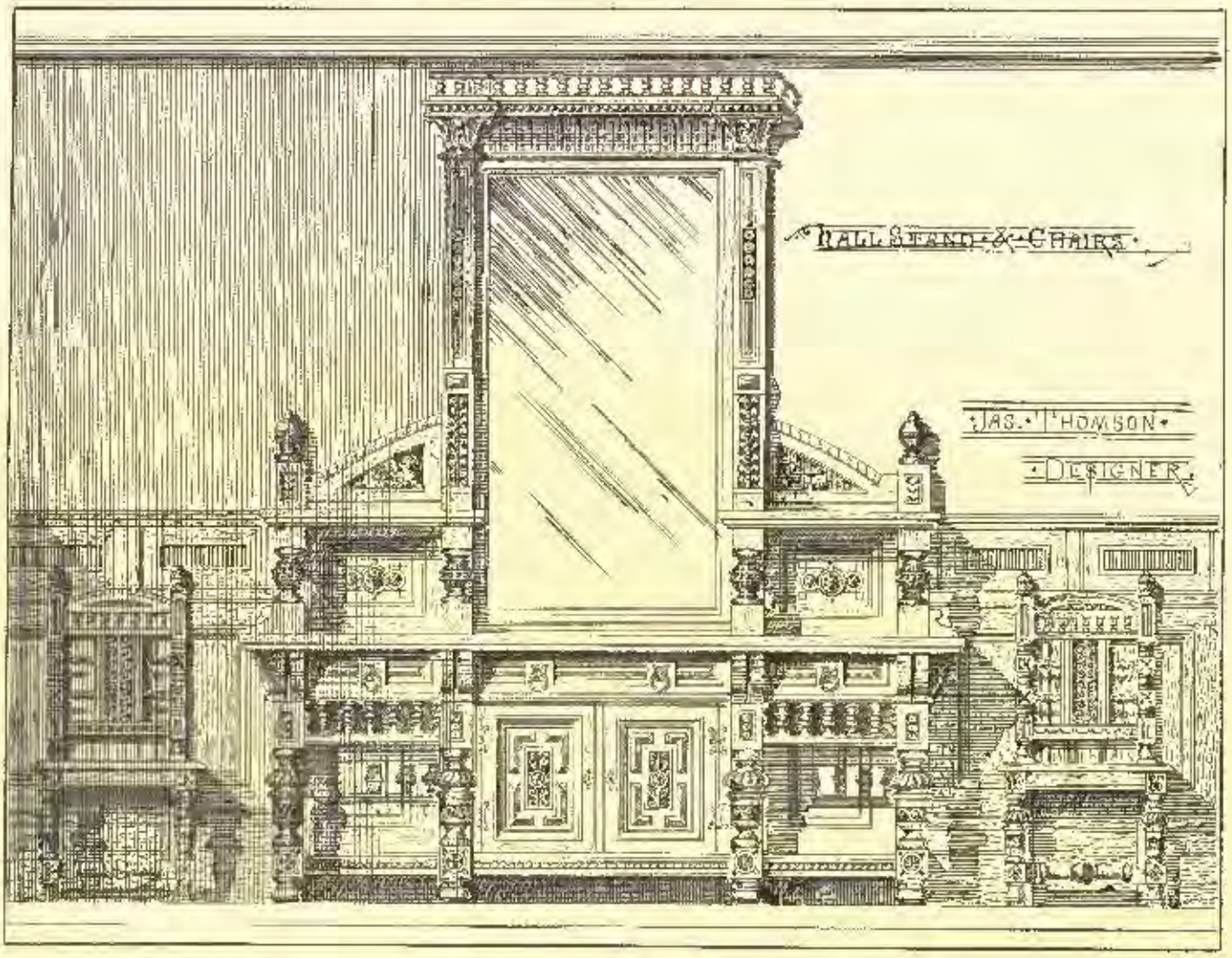
These buildings were erected for William Whiting, Esq., the present mayor of Holyoke, and are now rapidly approaching completion. The hotel-building is constructed of Philadelphia pressed brick, with finish of light Nova Scotia sandstone, and comprises stores on the ground floor, dining-hall, kitchen, parlors and chambers on the second and third stories and a public hall on the fourth story. The tower is about one hundred and fifty feet in height. On the exterior of the opera-house, light Philadelphia and dark Holyoke pressed brick are used; and bands of black brick and panels of majolica tiles are introduced. The central gable is further ornamented by two circular panels containing heads of Comedy and Tragedy. The auditorium includes an orchestra, parquet circle, and one gallery, and has a seating capacity of about eleven hundred. It is finished throughout in the Neo-Grec style. The plan is circular. The ceiling consists of a large coved cornice, pierced by eight semi-circular lunettes (forming a series of furred vaults), surmounted by a flat dome, and is ornamented at the centre with a rosace, which serves as a ventilator to the auditorium, and from which depends a large brass chandelier. All the ornamental work is executed in papier-maché. In the two proscenium, though merely decorative features, an attempt has been made to render them essentially architectural. The entire theatre is being decorated, and will be ready for dedication by the middle of March. The cost of the two buildings, exclusive of the land, will be $125,000.

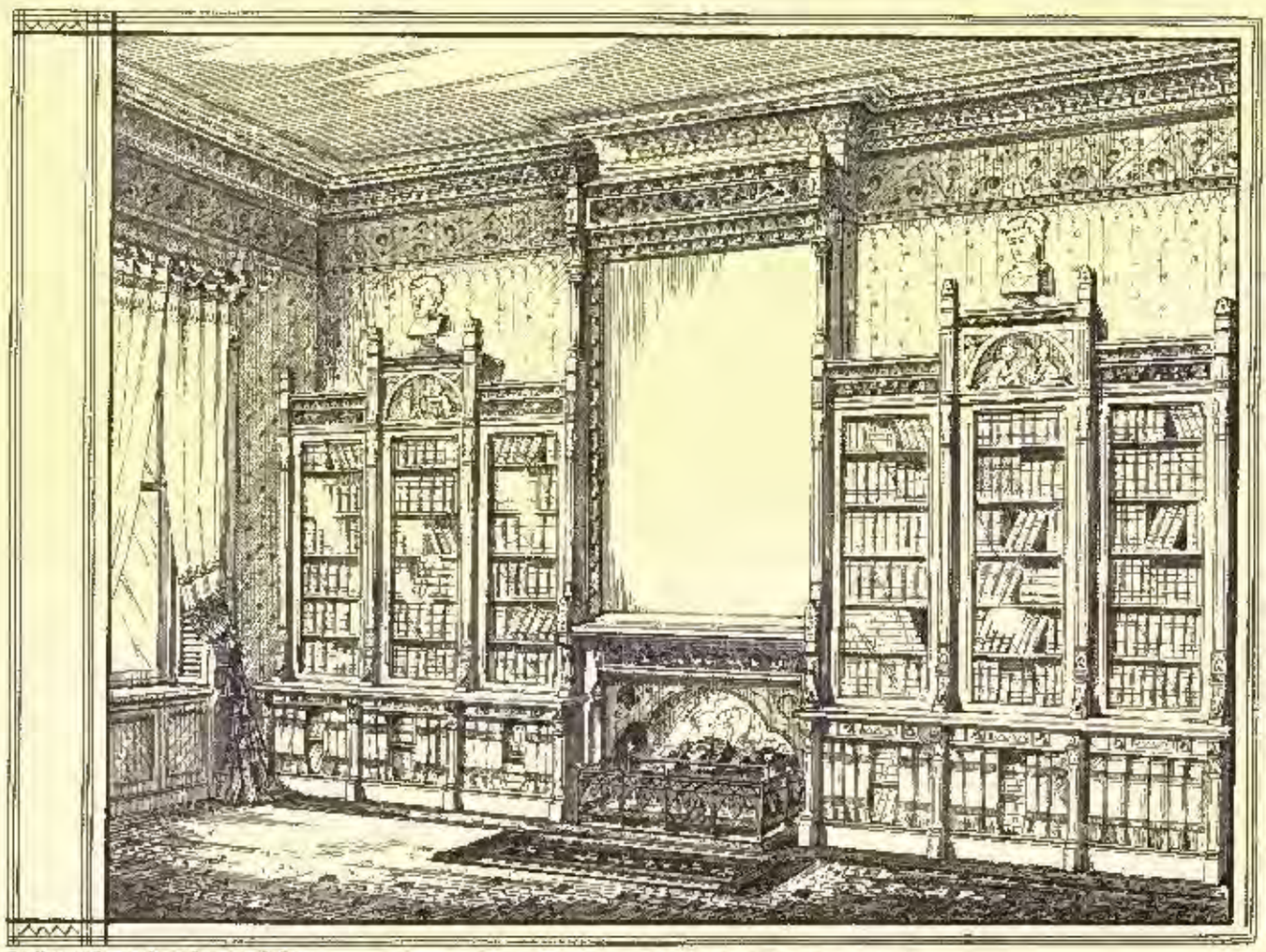
DESIGN FOR A DWELLING FOR MR. PIERCE, BROOKLINE, MASS. MESSRS. G. R. AND R. G. SHAW, ARCHITECTS.

CONCRETE DWELLING-HOUSE IN VORWOHLE.

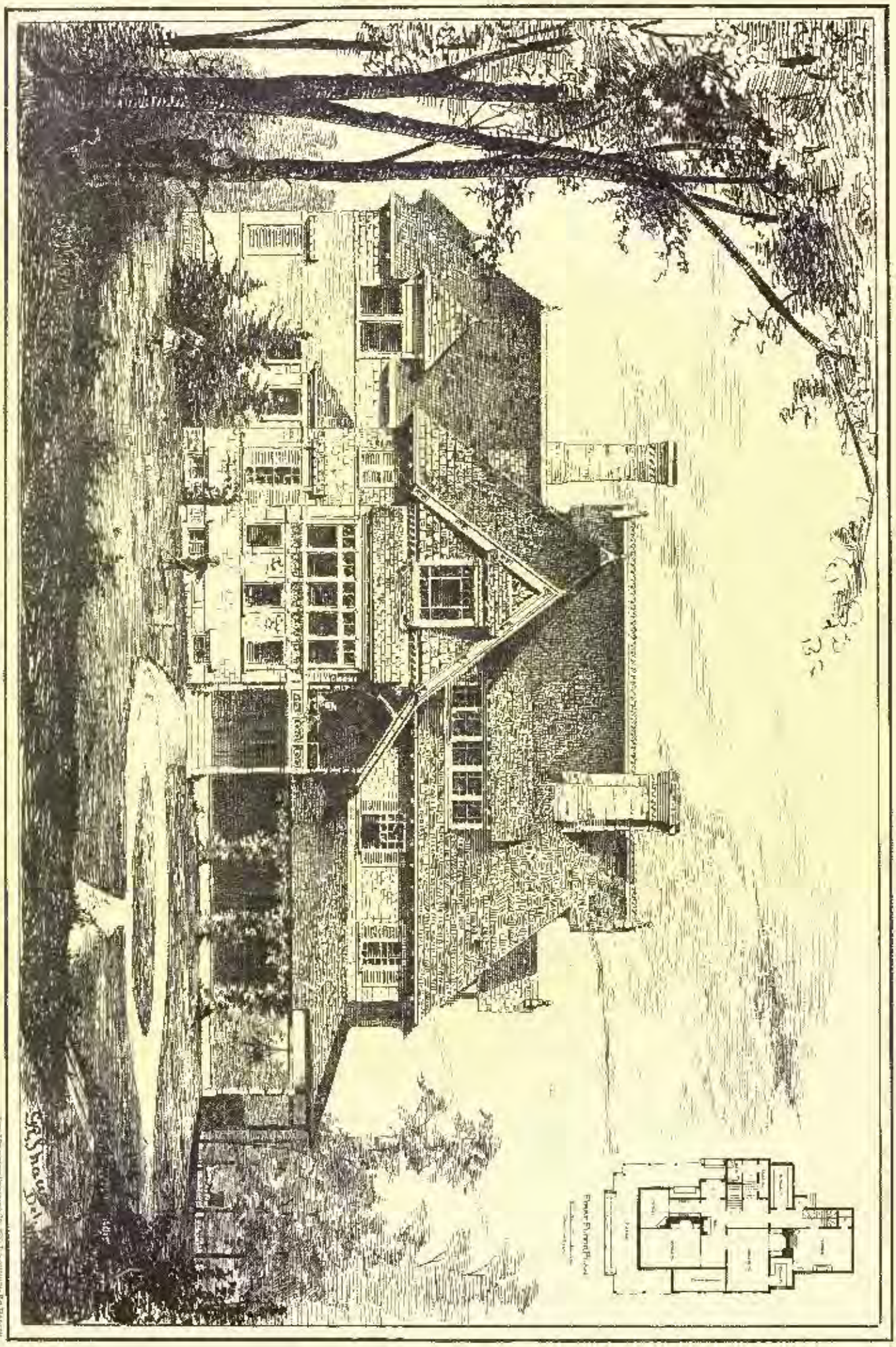
Mr. Liebold, an architect of Holzminden, has published in the *Deutsche Bauzeitung* an account of a dwelling-house of concrete, lately built by him in Vorwohle for a gentleman engaged in the manufacture of Portland cement. Although the house (see illustration) was quickly built, it yet seems to contain a *tour-de-force* of almost every constructive form for which concrete can be employed. The rooms are covered with various kinds of vaults, many of which have a very considerable span. Over the vestibules of the different stories — spaces thirteen by seventeen feet — three vaults are superimposed without the use of iron, and depend solely upon the vaults of the adjoining rooms for a counteraction of their side-thrust. The original and striking feature of the building is the great cloister-vaulted roof, which, resting on the four principal corners of the structure, rises through a story and a half. At its base, the concrete of which it is formed is one foot in thickness; at its summit, only from four to five inches. It is to be regretted that it has received no architectural expression on the exterior; the objectionable mansard is excused by Mr. Liebold on the ground that it was desired by his client. The outer walls of the house are one foot thick; division-walls and partitions being from eight to ten inches thick. In the cellar these dimensions are increased by four inches. The walls are anchored at suitable points, and were built above ground by means of adjustable wooden boxes, into which the cement is poured. Below ground, the cellar and foundation walls were cast in trenches, the cellar itself not being excavated until after their hardening. The trenches, consequently, were dug to the depth of the cellar below the level of the earth, plus that necessary for the foundation below its floor. This total depth must have been between seven and eight feet, and can only have been obtained in firm soil.

The concrete employed was composed of one part cement to seven and four parts respectively of gravel and sand. The stairs have treads of slate, and are cast so as to measure on the string four inches at the re-entrant and seven inches at the outer angle of each step. In them a coal-slag was substituted with good effect for the gravel; the weight of the concrete thus prepared being but from one-half to one-third that of the concrete made with stone. The cornices, window-casings, steps, etc., were formed of three parts of sand to one of cement, and were ready to be walled, or rather cast, into the walls, as the building advanced. The entire cost of the house, which is in effect a cube with a side of between fifty and fifty-five feet, was $4,300 gold. From the itemized account it appears that all the interior vaulting cost $120; the stairs, $82; and the roofs and the platform, $138, — all in gold. The cost of concrete walls, including the wooden forms, etc., was 13½ cents per cubic foot. The building was completed in four months, and its construction may be regarded as thorough in every respect. Immediately after it was roofed in, the inspector of buildings ordered the floors throughout the house to be weighted with sixty-five pounds to the square foot. This great weight did not produce the slightest hurtful effect on the vaults, — not even a crack in the plasterings. As a preliminary experiment, a pair of concrete vaults were built last year in Vorwohle over a space thirteen by fourteen feet, the length of which was divided into two equal parts by an iron I beam; the walls, also of concrete, were twelve and eight inches thick. The centre of this vault was weighted on a space containing thirty-one square feet with a weight of five tons, that is to say, over 330 pounds to the square foot; yet there was no displacement or crack either in the walls or vault. As a further example of rapid construction, a bridge was built of concrete, and prepared for use in six working-days, which was twenty-four feet long and twelve feet wide; and a smaller concrete dwelling-house, forty-three feet by thirty feet, was entirely completed in seven weeks. It is to be hoped that the official experiments now being made by the Polytechnic of Brunswick upon the strength and reliability of concrete will soon be made public, as their results bid fair to be surprising.

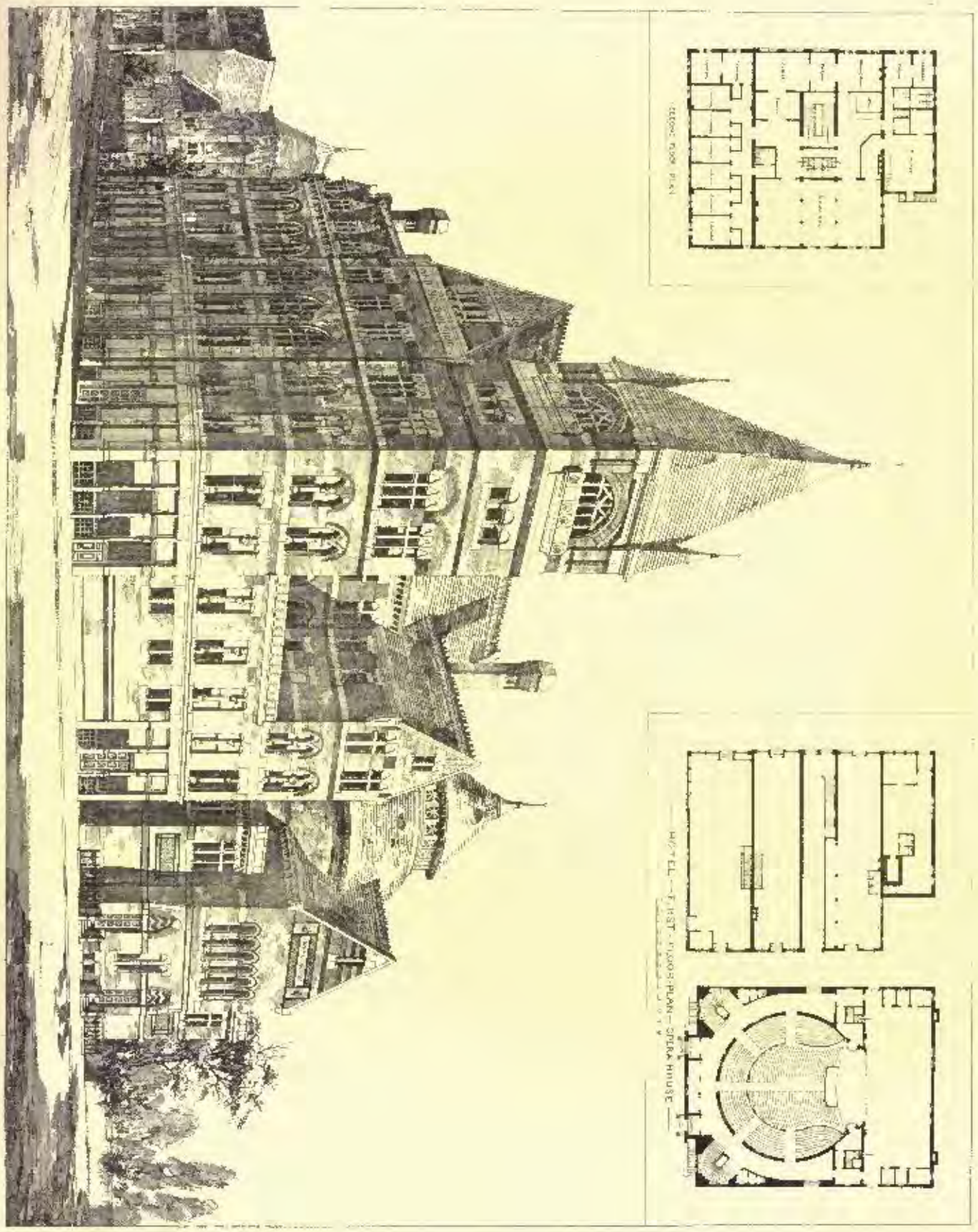




LIBRARY DESIGNED BY A. FIDLER - CHICAGO. ILLS

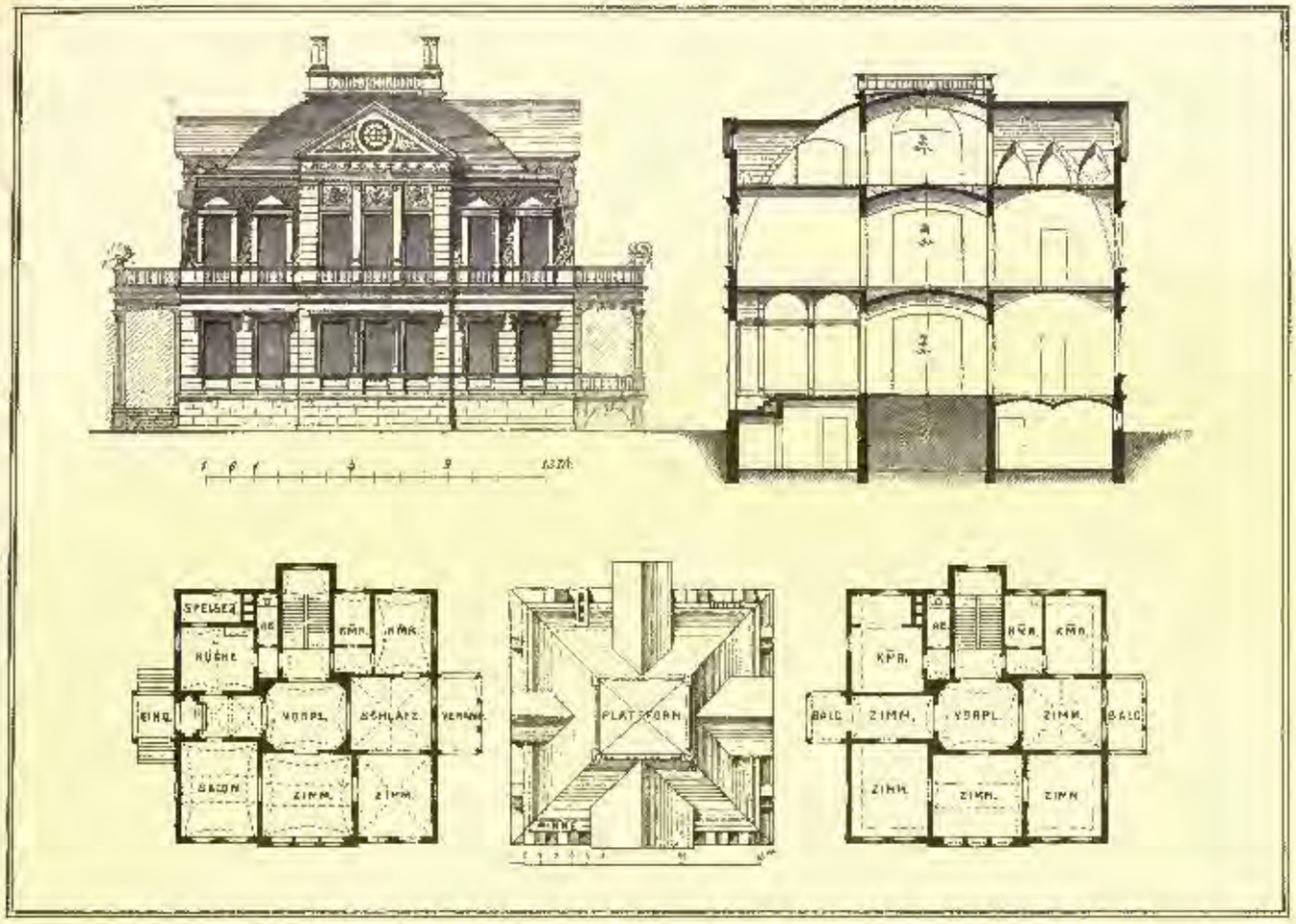


HOUSE OF MR. PIERCE BROOKLINE MASS.
— MESSRS. CH. & S. D. SHAW ARCHITECTS —

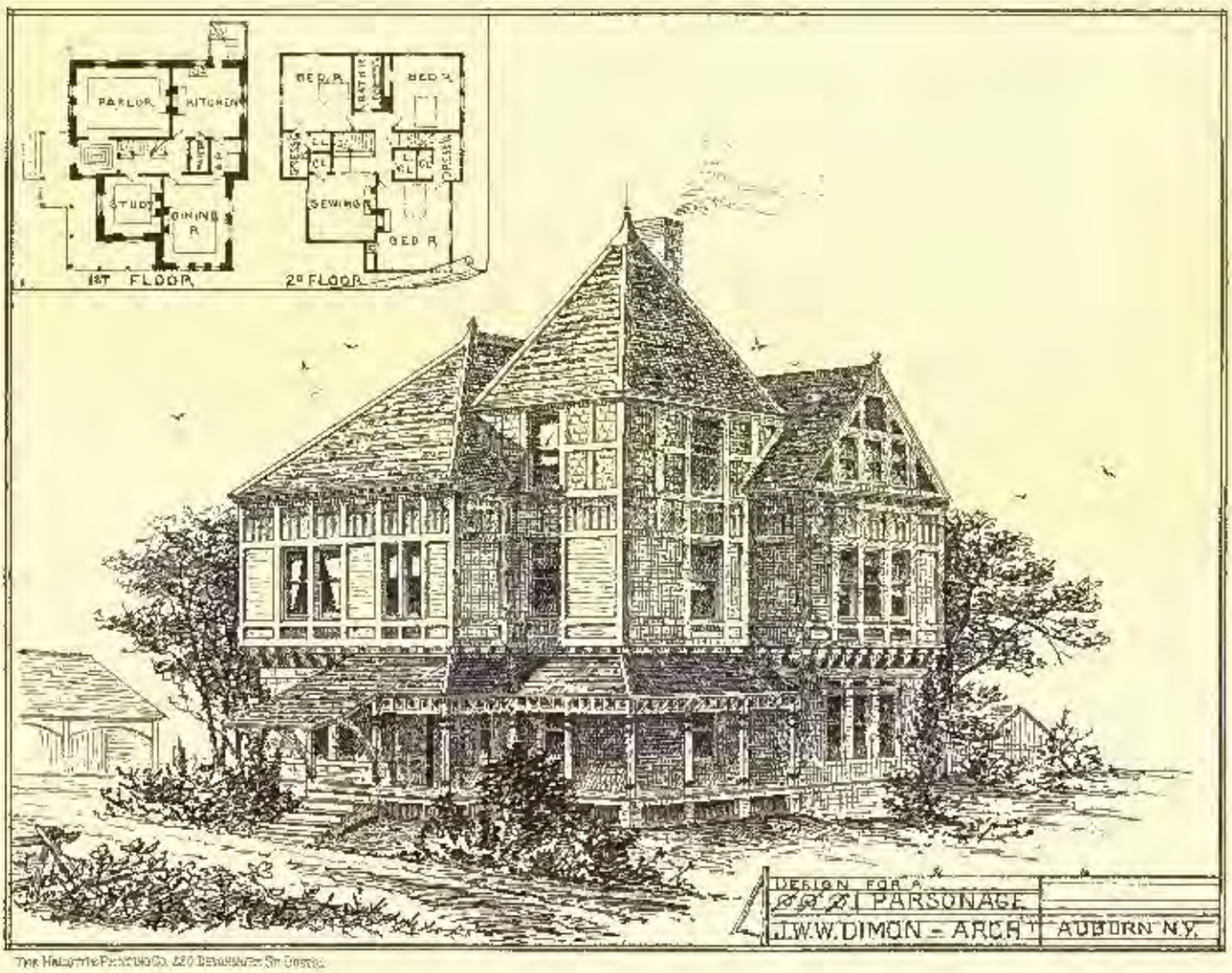


WHITING BUILDING AND OPERA HOUSE, HOLYOKE, MASS.

MR C.S. LUCE, ARCHITECT.



CONCRETE HOUSE AT VORWOHLE



THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON.

INTERIOR OF A LIBRARY. — HALL-STAND AND CHAIRS.

PARSONAGE. MR. J. W. W. DIMON, ARCHITECT.

The first story is of stone, while the outside panels are plastered in the second story, and slated above that.

BOOK NOTICES.

HAUPT'S ENGINEERING SPECIFICATIONS.[1]

In some well-regulated engineering and architects' offices, there may be found a collection of printed forms of contracts and of specifications; preserved specimens, as it were, of the blossomings whence ours developed the fruit of that and of other offices. The book before us is so constituted that it may take the place of the above-named motley collection. There can be little question, of course, in the minds of experienced persons, as to the utility of a handy collection of forms for contracts, specifications, bonds and advertisements belonging to the profession. These are matters of wearying detail, which it were sinful waste to excogitate out of the depths of one's own consciousness and experience at every call thereon. Whence it happens, that in the United States and other public architectural and engineering offices of the country, there are printed blank forms for all such documents; and it is from a very judicious selection of such forms, and some derived from private practice, that the present book has been put together. They include not only engineering works, as the title might lead any one to suppose, but a good deal of architectural work besides. We have, for example, "Estimate for an art-building at the International Exhibition, specifications for a college building, and for a railroad depot." As a connecting link between architecture and engineering, unless it may be found in the railroad depot, is a set of documents, being all that is necessary for the specifying, the advertising for bids, and the contracting for the erection of a light-house, and the same series of papers for a large variety of the works that ordinarily come within the province of the engineer, classified under the heads, "River and Harbor Improvements, Municipal Works, and Railroad Engineering, including engines and rolling stock." And as the future writer of specifications and contracts, the student, for whom more especially this work seems to have been designed, must know something of the nature of drawings, and of the manner of making measurements and estimates of all kinds of work, two short chapters on these subjects provide the bulk and body of the work. The close consists of a semi-legal consideration of the nature of contracts with samples of contracts for different kinds of work. No great originality ought of course to be expected from a work like this, in which the classification of documents already in existence must play so important a part; but this classification has been exceedingly well done, developing, not infrequently, into a codification of the subject matter.

While thus commending the book as a whole, we take the opportunity to warn the youngest readers of the work against the fascinations of chap. vi., the part treating of contracts and of the law of contracts. "Every man should know a little of law," said the English father of law, Justice Blackstone; "and the less, say we, the better," says the comic Blackstone. We miss a word of caution to the student, not to trust too much to such knowledge of the law as may be derived from the study of this one chapter. The great American people need no lesson taught them so much as that which induces each man to mind his own business. Let us consult lawyers on matters of law, as we believe in being consulted on matters of architecture and of civil engineering. And if these remarks hold good of chap. vi., what shall be said of the appendix, containing the ruling of a single Philadelphia justice upon the bearings of a common clause in contracts of the kind here treated? The students of the Middle Ages had a sensible proverb, "Beware of the man with the one book;" but from a study of this appendix we should add, "the lawyer with the one decision." This sort of law will not do to be relied upon. In the humble opinion of the reviewer, it is going too far, even, to allow this one ruling, and the single unusual set of circumstances that seem to have led to the suit in which this ruling was rendered, to introduce the clause in the contract printed on page 260, as seems evidently to have been the case. An architect or an engineer having a work in charge should be, and generally is, an honest man; the clause making him the sole arbiter in disputes as to the meaning of the specifications, and of quantities of work, is an old one and a common one; it has contributed no little to the honorable standing that these professions have, that it has been found that the duties imposed by this clause may be put upon them. It makes them respected alike by the builders and contractors, and by the parties who pay for the work done. The maintenance of this clause in its present entirety should therefore be jealously guarded by the profession. In this vicinity, certainly, no case has arisen within the last fifteen years, — and before that time men are said to have been still more honest, — wherein a well-founded complaint could be made against the integrity of the architect or engineer umpire. The complaints of this sort that are usually tried have, so far as the reviewer knows, always consisted of pleas for extra compensation, when agreements as to the value or amount of such extra work were not specific under the contract, and could honorably give rise to differences of opinion. But if, as now proposed on page 260, as cited, the party of the first part is to dispute the certificates of the engineer, why not also the party of the second part? and if both parties are to dispute his certificates, why have him at all? It is but another version of the old query of "who will watch the watchmen?" And the remedy is none other than experience has shown to be the only proper one. Put an honest engineer or architect in charge; if you are deceived, pay the bills and do better next time. But the chance of such an event, be it noted, is in this instance so small, that it may well be left almost out of consideration. We venture the assertion, that, should a second edition of Professor Haupt's book appear, the clause which has been discussed will by that time be found to have been modified, even in the temporarily excited city of Philadelphia.

While commending the general nature of this work, the good arrangement of its contents, and other indications of good editorial work, we wish we might say as much for the mechanical execution of the book. Though agreeable in outside appearance and in type, the binding is execrable; the red paint on the edges of the book soils the reader's fingers; the advertisements in the back of the book, and as per frontispiece, have ceased to be in good taste in an "American book" also. However, the price is reasonable, and to a multitude of people, it is worth the money; and that, after all, is the main thing we each of us want to know about a book.

The first number of the *Useful* for 1878 appears in a new dress, with the imprint and address of a well-known firm of furniture-makers and decorators in Boston, but without too strong a savor of advertising. It shows an intention of returning to its first proposal to publish "ornaments of all periods and styles, by giving two sheets of ornamental details historically classed, and one of Pompeian decoration." One of the sheets of details is of architectural features, chairs and candelabra said to be of the time of Louis XVI. The other is entitled, by a queer misnomer, "Roman Details," the adjective being apparently borrowed directly from the French, — unless the editor is an extreme disciple of Mr. E. A. Freeman, — for the details are shafts, capitals, and archivolts which clearly date from the eleventh and twelfth centuries. The clever original designs are not so carefully drawn as heretofore, and betray throughout the number a decided tendency to reptilian forms.

In our notice of the *Roheleger* (*American Architect*, No. 114), we inadvertently did injustice to the *Metal-Worker*, published in New York, in saying that the *Plumber* was the first paper in this country to give special attention to sanitary plumbing. The *Metal-Worker* has made this subject a conspicuous specialty for some time past in an intelligent and progressive way of which we are glad to make this recognition.

We have received from Messrs. A. Williams & Co., guide maps of London and Paris, copyrighted by George H. Young, and published, no doubt, with an eye to the crowd of Americans who may be expected to cross the Atlantic on the way to the French exhibition of this summer. They are block plans, as it were, issued at a low price, printed in a tint, and show clearly the principal streets and landmarks, omitting a great many of the smaller streets and alleys that fill in among them. They are covered, after the manner of the cheap plans popular in Paris, with illustrations in their proper places of the chief buildings of interest, not too clearly printed, but obvious to the eye. The plans are without scale, and the inexperienced traveller might be disappointed in finding that the distances on them much exceeded his expectation, or that the street on which he secured his lodging was not laid down. They are, however, maps of a kind to give the information that most travellers desire, with little trouble to them, and that prove to be convenient and popular. These are apparently as good of their kind as those that are commonly met with abroad, and there is an obvious convenience in providing one's self with them before one sets out on his passage rather than after.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

An adjourned meeting was held at the office of the President on Thursday, March 7, for the purpose of taking action on the report of the committee having in charge the consideration of the question, what aid, if any, should be given by the society in furtherance of the proposed enterprise of Mr. J. T. Clarke, junior member, viz., to visit the unedited remains of Greek Doric temples in Sicily, Corfu, and the islands of the Ægean Sea, with a view to acquiring additional knowledge of the spirit and methods of Greek art.

After discussion it was finally voted to appropriate to this purpose the sum of three hundred dollars, provided an equal additional sum can be raised by a committee of three, to be appointed by the President. Messrs. Longfellow, Sturgis, and Van Brunt were appointed on this committee. The meeting then adjourned.

[1] A Manual of Engineering Specifications and Contracts. By Lewis M. Haupt, Professor of Civil Engineering, Towne Scientific School, University of Pennsylvania, etc. Philadelphia; 1878. J. M. Stoddart & Co.

CORRESPONDENCE.

A NEW APARTMENT-HOUSE.—THE BUILDINGS IN CITY-HALL SQUARE.

New York.

The spring is opening rather lazily in the building line, though there is a very manifest improvement over the aspect which affairs bore a year ago. With the Astor Office building at the lower end of Broadway, and a few other large buildings which will be erected if the Department of Buildings shall do its duty in condemning several old rookeries about town, the chances are that the building-trades will be fairly busy.

Mr. William Kuhles has under progress a large French-flat building for Mr. C. R. Peters, to stand on Fifty-ninth Street, between Fifth and Sixth Avenues, overlooking the Park. The lot is fifty feet wide by one hundred feet deep, and is to be entirely covered by the building and its air-spaces. Each floor will have two suites of apartments, giving more than the usual allowance of room. The front is in Philadelphia brick with Nova Scotia stone up to the second story. There is the usual pair of polished red granite shafts on either side the main entrance. In panels below the windows of the principal floor, and in a series of spaces over the windows, Mr. Kuhles has decided to use the German sgraffito work from the Charlottenburg works near Berlin. It is of a compact texture, with light-tinted bas-relief ornaments upon a dark ground. The work will be inserted in recesses of the stone-work when that is finished, and Mr. Kuhles is of opinion that it will be found to stand well in this climate, though no example of its use now exists in this city. In the broad faces of the brick wall, several other medallions have been inserted, and in other parts the architect has followed a very eclectic course in the use of materials. The entire building, six stories in height exclusive of an attic story, will cost about $70,000.

At the other end of the city from this building, an important work is going on in the patchwork additions to the new Court House standing in the City Hall Park. The work is not out of place, since the Park has long been a place for every thing and any thing. To a critical observer, a few moments spent in this place will not rouse encouraging thoughts of progress in art in this city. There are old buildings and new ones, but merit and novelty do not come together. The old City Hall, built in the early years of this century, stands to-day solid and firm; a good Italian model, unpretentious yet excellent, with faults, but beyond question the best of the public buildings in the old Common. The Post Office building by Mullett, in its paltry greatness, its poverty of invention, and meanness of motive, but barely covered by its bulk and the excellent materials used, in the popular mind is accounted good, but pretty much on the ground that the Pyramids might be styled excellent art, because they are bulky and built to last. There are a few minor court-rooms in another building, whose chief characteristic is its wretched ventilation; and then last on the list of this congeries of buildings stands the New York Court House, the place from which the most magnificent public stealing known in municipal history was done. Its architect, the late Mr. Kellum, chose the Palladian Italian style, and carried it out fairly into a building whose halls and passages are the darkest in the city, and whose waste of interior space is most remarkable. Upon this has recently been grafted an addition by Mr. Leopold Eidlitz. Of course no attention was paid to the design of the existing building, and within and without a rank Romanesque runs check by jowl with the old Italian, one bald, the other florid; cream-colored brick and buff sandstone come in juxtaposition to white marble. What was merely proposed to be done in the case of the Albany Capitol, has actually been carried out upon our unfortunate Court House, and only raises the provoking wish that the whole edifice had been done by the hand that could produce the excellent though misapplied addition. As it now stands, the *ensemble* will always remain an eyesore to those who believe that purity of style and freedom from admixture, in forms and spirit, is a merit. If, as more than one prominent architect in this city declares, "style is nothing," then the criticism of such mongrel buildings as the Court House must be approached from a different standpoint; but at present, protest must be entered against the tacking on of additions, however excellent, to buildings designed under a totally different motive. W.

NEW WORK.—A CHURCH COMMITTEE IN THE OLD RÔLE.

St. John, N.B.

A number of peculiarities in construction may be noticed in practice here, such as the use of hard-pine lintels in place of iron or stone to carry the store-fronts,—large three or four story buildings having their façades supported in this way: another manner of accomplishing the same object is by brick arches, the tops of the iron columns being cast in the form of skewbacks with a segmental arch thrown from one to the other, which gives the front an appearance of support which it lacks usually, and presents also a somewhat pleasing effect.

Among the new buildings to be erected the coming season may be mentioned the post-office, custom-house, and savings bank buildings, all for the Dominion Government, the plans of which have been prepared by the chief architect, Mr. Scott, at Ottawa, and are to be superintended, I believe, by local architects. The city government itself has not been behindhand in building-operations, as may be seen by the buildings for the water-commissioner, a police-court, hook-and-ladder house, ferry-house, and city-hall; the first three of these are nearly completed, while operations on the latter two will begin as soon as spring opens. Mr. W. G. Preston's design for the police-court is perhaps the most noteworthy of any that have been executed. Mr Preston is also the architect of the ferry-house. The city-hall will undoubtedly be the most costly of the municipal buildings. I have not seen the design, but, to quote one of the local newspapers, "The style of architecture adopted is the Renaissance, but treated in a manner suggestive of the 'Queen Anne' mode, at present the reigning fashion in England." Whatever this may mean, is left for the readers to infer. It will have a frontage on Prince William Street of fifty-eight feet, with a depth of forty-six feet, and is to be of freestone, three stories high with a mansard roof. On the front, emphasizing the main entrance, is a pavilion, carried in the form of a tower some twenty feet above the roof. The interior finish throughout will be of hard wood. Messrs. McKean and Fairweather are the architects.

Very few dwelling-houses worthy of mention have been built, so far. A costly one in Germain Street is characterized by the extensive use of galvanized iron. Perhaps the neatest and prettiest little house in town is that by McKean and Fairweather, in Orange Street, for Mr. Donald McKenzie. There has been, of late, much talk of rebuilding the Victoria Hotel, the work to be undertaken principally by Boston capitalists. The old hotel was undoubtedly the best in the Maritime Provinces; but as it did not pay, it is questionable whether enough money will be forthcoming to warrant the rebuilding of it.

The Methodists in the adjoining town of Portland, purposing to rebuild their church edifice, which was destroyed in the fire of last autumn, called for competitive drawings. They were sent in. Members of the committee then went to several architects, giving them to understand that they each had been awarded the job; afterwards it was voted in committee-meeting to employ a certain firm as architects, and to confer with them in relation to percentage. This firm would not undertake the work under the usual five per cent; another man steps in, and says he will do it cheaper; and the committee are now vacillating between one and the other. This is not an isolated instance of the practices of architects and clients here. It is understood that the competition for the Germain-street Methodist chapel has been awarded to Mr. John Welch of New York, who is also the architect of the new Centenary Chapel. A large number of architects and draughtsmen are here from all parts of Canada and the United States, many of them without employment. A large number of those who came here last summer after the fire have already returned home. It is doubtful if work will be very lively the coming season.

Warrington.

DIRECT RADIATION AND VENTILATION.

All physicians and sanitarians fully agree, I believe, that the conditions of atmosphere and the application of heat found on the sunny side of a mountain on a bright, clear day in autumn, are the best adapted either for the recuperation of the exhausted system or for the maintenance of robust health. We should take the conditions found there, as we understand them, for our standard, and endeavor to imitate them as closely as possible in our artificial arrangements. But the popular method of warming buildings is by placing all the heating-surface in the cellar, and making use of the fresh air supply to convey the necessary warmth to the various rooms in the building. For this purpose all the air must be over-heated; it must be warmed sufficiently in excess of the required temperature of the room, to compensate for the loss of heat through the cold windows and cold walls.

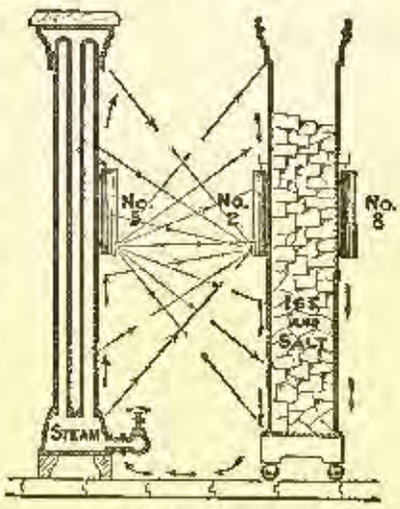
By this method of heating, the air of a room must necessarily be warmer than the solid objects of that room. The persons in the room are surrounded with and inhale air warmer than the temperature of the room as indicated by the thermometer.

We scarcely realize that a thermometer in a room may be very far from giving the temperature of the air in that room. It is possible for the air to be at zero, and yet the thermometer surrounded by that cold air to indicate 100°, or even higher. We could realize this by imagining ourselves standing to the windward of a great fire. The radiated heat might make it unbearable several hundred feet distant. It is stated that at the Chicago fire the radiated heat was sufficient to destroy buildings on the opposite side of the street, directly against a strong wind.

A very simple experiment made in a room with an open fire, and an open window through which into the room blows cold air, will illustrate this. If we take two ordinary thermometers, hanging them back to back, one turned towards the fire and the other towards the window, we shall immediately find a great difference of temperature indicated, yet both surrounded by air of the same temperature.

The subjoined diagram, giving the results of seven experiments made from 11.20 A.M. to 2.45 P.M., Feb. 26, 1878, will illustrate more definitely the proportion of indicated temperature due to

direct radiation, and that due to air-currents. A metallic box filled with ice and salt was placed twelve inches from an ordinary steam radiator. Three thermometers were hung against the heated radiator, and three against the ice-box. The thermometers numbered 3 and 4 in the diagram were placed in a double tin tube, open at both ends for the free circulation of air, but protected from radiated heat.



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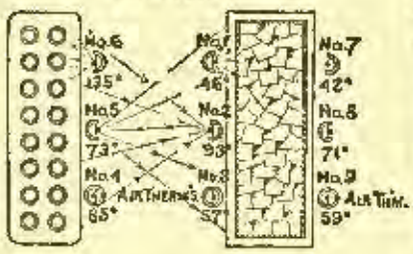

PLAN.

TEMPERATURE OF ROOM, 68°. EXTERNAL TEMPERATURE, 3°.

So placed, No. 3 indicated 57° as the temperature of the air descending by the ice-box; while No. 4 indicated 85° as the temperature of the air ascending by the radiator. The other four thermometers were placed in half cylinders of double tin, exposed on one side for radiation, but open at both ends, and therefore subject to the influence of the surrounding air. Being arranged as shown on the diagram, Nos. 2 and 5 present a strong contrast. No. 2, hanging against the ice-box in a current of air of 57°, indicates 93°, which is 36° higher than the air surrounding it. This added heat was due to direct radiation; while No. 5, hanging against the radiator in a current of air of 85°, indicates 73°, or 12° less than the air surrounding it, showing that the thermometer had radiated its heat to the ice-box. (This illustrates the loss of heat which frequently occurs from the person to a cold wall or window in proximity.) Nos. 1 and 6 indicate a temperature nearly 90° different; one receiving the full force of the radiation from the radiator, and the other losing its heat to the ice-box.

These experiments show how a room may be filled with air at 100°, and yet, with cold walls and windows and floors, the thermometer might indicate only 70°, and *vice versa;* and indicate the weak point of the common method of over-heating the air, leaving the walls and floors cold to absorb the animal heat from the persons occupying the room.

Compare this now with our standard, and we find this remarkable difference. In the external atmosphere the solid objects are invariably warmer than the air surrounding them. In the direct rays of the sun this difference between the temperature of the air surrounding us, and the actual warmth upon our bodies, is very great. It is not an unusual condition in winter, to have the air below the freezing point, and the sun shining so powerfully that a thermometer exposed to its direct rays and yet surrounded by this cold air would indicate ninety-eight degrees, or a temperature equal to that of the human body. Out of doors, while surrounded by a cold, invigorating atmosphere, we have the sun pouring upon us its vivifying rays, and filling our bodies with the vital element of heat, instead of having to pour out our vital heat to the cold walls.

Unimportant as this difference in condition at first appears (having received but little attention from physiologists), yet more careful study reveals facts worthy of our serious consideration. From the few experiments that have been tried to ascertain the effect upon the body, of air at different temperatures, it is assumed that twice as much carbonic acid is exhaled when the body is surrounded with and we are inhaling air near zero, as when we are surrounded by and inhaling air near the temperature of the body. Should more careful investigations prove these surmises to be well founded, this would explain the great difference between the distressing, debilitating feeling experienced in our cold-walled rooms filled with hot air, and the bracing and invigorating effect noticed in the open atmosphere on a clear, bright day.

Americans are more to blame for the popularizing of this great national curse of air-heating than any other people. They have pushed it more persistently than any other nation; and many of the most intelligent of them still insist on pouring more and more of the heated air into all our public buildings and our legislative halls; notwithstanding that year after year the legislators assembled in these buildings protest against it, and refuse peremptorily to be comforted by the ingenious schemes of the engineers, or the most subtle artificial mixtures of the scientists.

If, on the contrary, it is possible to double the working of our whole system in a perfectly natural way, without causing its more rapid destruction, a splendid opportunity is thus offered for the ingenuity of the sanitarian; and should this cold-air theory of invigoration prove correct, the physician may yet learn that he has no agent readily at command half so effective as the air surrounding his patient.

How important, then, that in buildings intended for the education of our children, these fundamental principles should be fully illustrated; and further, that they should be fully instructed as to the great sanitary importance of having cold air for breathing, and not be allowed to accept this or that method of heating and ventilation merely for its mechanical convenience!

Believing as I do that the over-heating of the fresh air supply is entirely inadmissible on sanitary grounds, the next point to consider is the suggestion of a better system. If the air in the room is cold, there must be some other means of giving the necessary warmth to the person. From a sanitary point of view, the open fire is the most perfect arrangement for artificial heating with which we are acquainted. All the air warmed directly by the fire escapes up the chimney, and we have nothing but the pure radiant heat coming into the room. This radiant heat warms the persons and solid objects in the room, but does not warm the air if pure. But to keep up open fires in every room in a building would be attended with much trouble; it would also consume much fuel; the distribution of heat is also very uneven. Very good results are obtained, giving general satisfaction, by warming the floors and walls of the rooms, or by placing exposed heating-surfaces directly in each room; and this brings us to our second proposition.

Until recently but little attention has been given to warming separately and by radiation each room of a whole building from one central source; consequently the mechanical contrivances for accomplishing these results are as yet very imperfect. Such inconveniences, however, must be met and overcome, for sanitary necessity requires it. The simplest form, which has already been adopted in many cases, is to place coils of pipe or other heating-surface directly under each window. In this case the excessive cooling of the window is counteracted by the excess of heat directly under it. The convenience of obtaining a fresh air supply by simply raising the window directly over the heater is of considerable importance; the meeting in each room of the extremes of heat and cold at times requires some care of adjustment to produce the desired result.

Perhaps more effective results may be obtained, and requiring less attention, by having the heat diffused over a larger surface, warming moderately the floor and the inner surfaces of the exterior walls. So little attention has as yet been given to this form of warming, that special mechanical contrivances might be required for its successful execution. This form of warming would probably produce the most satisfactory results. The question of the amount of air-supply to each room, as well as the temperature of the contained air, is of the greatest importance. In this connection the independent heating in each room has very great advantage. It has been found exceedingly difficult to control the movements of heated air satisfactorily. Many contrivances producing very unsatisfactory sanitary results have at times been resorted to in attempting to carry out the unnatural system of heating by hot air. The entering air being warmer than that longer in the room, it is almost impossible to prevent its rising quickly towards the ceiling; and if openings are provided there for ventilation, it at once escapes, carrying the much-needed warmth with it, thus producing waste. To obviate this, all openings in the ceiling are closed for the purpose of attempting to force the heated air near the floor; but it is still impossible, even by this process, to get a cold floor warmed to the temperature of the air surrounding the head. The feet are still cold, and the head hot. Another condition often obtained in a room thus warmed is where the air surrounding the person is so nearly the temperature of the body that almost complete stagnation occurs; such rooms closed tightly at top are often very oppressive and disagreeable, and at best can only be endurable, even for a languid, inactive person. I believe sanitary necessity requires a very liberal escape of the vitiated air from the ceiling of a room at all times; and this escape from the ceiling can be much better provided for when the heat is held in the floor itself than when contained only in the moving air. With the warmed floors giving warmed feet, and a gentle radiation of heat from the surrounding walls, the air may be at 40° and pass through the room quite rapidly without producing inconvenient draughts; then a liberal escape of the air from the ceiling may be allowed with but little loss of heat.

The varying direction and force of the external currents, often so troublesome with hot-air heating, have much less effect when heating by direct radiation. The heat is always contained in the solid objects in the same position. The air is left at liberty to move in any direction caused by the various surrounding conditions, but having little effect upon the heat. Moreover, with direct radiation the heating-surface can be so exposed as to be

readily cleaned every morning. With the nests of pipe used for air heating, the surface frequently becomes covered with animal and vegetable matter, the heating up of which causes a very unpleasant and unwholesome odor.

While I believe it would be best, physiologically, to have each room filled with cool air, and the necessary warmth given to the person by diffused radiation from the solid objects of the room, yet owing to the general apathy and the almost universal ignorance of the sanitary effect of such a system of heating, it would be very difficult to get the necessary care in the management of a system at present so little comprehended or appreciated. Very cold air is probably a very powerful agent in favorably affecting the human system, but like all powerful agents requires great care in its application. In passing large quantities of very cold air through a room, great care would be required to prevent some portions of the body being exposed to a stronger influence from the cold air than was counteracted by the direct radiation; consequently, for the present I would suggest compromising the matter, and partially warming the air in very cold weather.

Air at 45° or 50°, with good bright radiation, is not bad, especially for mere existence when no special activity is required. The partial warming of the fresh air supply can be done in various ways. I like it done in large masses so that it may become well mixed, avoiding unpleasant jets of varying temperature, making the halls the great reservoirs for the fresh air supply.

* * *

SOOT-STAINED PLASTER.

Pittsburgh, Feb. 19, 1879.

Editors of American Architect.

Gentlemen,—Can you tell me through the *Architect*, or by letter, any thing which will take sulphur out of plaster? It was caused by putting old brick in the wall, which had soot on them.

Yours truly, A Subscriber.

NOTES AND CLIPPINGS.

Public Monuments.—The bronze bust of the Italian republican Mazzini is to be unveiled in Central Park in New York, in the latter part of May. It is five and a half feet high; and the granite pedestal is to be sixteen feet high. The foundation for it has been laid opposite the statue of Daniel Webster. The cost will be $22,000.

A monument to be erected at Annapolis to Baron DeKalb is proposed by the Maryland Legislature. Congressional aid is to be solicited.

The Kentucky Legislature has passed to second reading a bill appropriating $10,000 for a monument to John C. Breckenridge, and has incorporated an association to collect funds for the same purpose.

The statue of the city of Manchester (N.H.), nine feet high, for the soldiers' memorial fountain in that city, modelled by Bulat at the National Fine-Art Foundry, New York, has been accepted by the committee, and by the architect, Mr. George Keller of Hartford. It will be cut in granite at Quincy, Mass. Four statues representing the army and navy of the late United States volunteer service, to be placed on a parapet wall around the fountain, and a bas-relief, representing the call of the volunteers, to decorate the pedestal of the central shaft, are now being modelled in New York, and will be cast in bronze at the same establishment. It is expected that this important work will be completed in September next.

Modern Anachronisms.—The *Saturday Review* discourses on the vagaries and inconsistencies of modern decorative art as follows: "When the Newton of the future excavates Kensington Gardens in search of the Albert Memorial, of which vague traditions will record the site, he will publish his discoveries in some such shape as this: 'At about the depth of seven feet, we struck on fragments of strangely debased and barbarous pottery. The plates were glazed and gaudily colored, with the feeble designs of an effete civilization. From the dress of the characters represented, we conjecture that a Japanese convict colony of deplorably low culture had overthrown, on this ancient site, a village of the English of the thirteenth century. Beneath a layer of plates covered with designs Oriental in conception, but Hottentot savage in execution, we discovered many examples of equally debased mediæval works executed by machinery. Mixed with these were specimens of porcelain which we can only attribute to the influence of the neighboring lunatic asylum at Hanwell, mentioned in the poetry of the period.' These will be the just and highly creditable inferences of the archæologist of A. D. 4878. What he will make of tablecloths 'which illustrate the history of the Assyrians,' according to Mrs. Loftie, or which are covered with pictures of the 'Ten Little Niggers,' it is impossible to say. He will probably guess that these objects had a religious significance."

Cleopatra's Needle.—The owners of the Egyptian obelisk lately brought to London filed affidavits in the action for salvage now before the Admiralty Court, to the effect that the obelisk was only worth $1,250, not so very much more than the value of the material as imported building-stone; while the iron caisson was rated as old iron at a valuation of $250. Naturally the salvors objected to this belittling of a work of art, and at length obtained a decree from the Admiralty Court fixing the valuation at $125,000.

An Artesian Well.—Water has been reached, at a depth of eighteen hundred and forty feet, in an artesian well at Charleston, S.C., which has been boring for fifteen months. It is proposed to supply the city with water by means of such wells.

Lake Mareotis.—In 1801, during the French occupation of Egypt, the English cut the Alexandria Canal dikes, and let the Mediterranean into Lake Mareotis, destroying 150 villages on the shores of the lake, and turning the plain into a morass. A Dutch company has obtained from the Khedive a concession to drain and cultivate the swamp. It is expected that 75,000 acres of land can be reclaimed, which will be turned into vineyards, where an endeavor will be made to cultivate the once famous Mareotis grapes.

German Exhibitors at Paris.—It is said that the Emperor William has given the German painters and sculptors leave to participate in the Paris Exhibition.

Underground *vs.* Overground Telegraphy.—The ultimate saving that may be effected in substituting a subterranean telegraph system for the present system is well instanced by the damage wrought by a storm in March, 1878, to the government telegraph-lines in Germany, whereby 1,073 poles were broken, 9,372 poles displaced or overthrown, 1090 stays and anchor-posts torn up; while the wires were broken in 1,691 places, and twisted in 720 places; thus making more than 32,000 miles of wire practically useless.

Power of the Waves.—Those who have never lived on a stormy coast, nor have been to sea, can form no adequate idea of the effect that can be produced by the impact of a succession of waves or of a single wave. What has happened at Wick on the extreme north-eastern coast of Scotland, where a breakwater has been building for some years past, may give an idea of what is meant by wave-power. It was found that stones of ten tons weight were as pebbles to the waves, which have been measured to be here forty-two feet from crest to the bottom of the trough. The outer end of the breakwater, where the storms beat most violently, was built of three courses of one-hundred-ton stones laid on the rubble foundations; next above these were three courses of large flat stones, and upon this a mass of concrete, built on the spot, of cement and rubble. The end of the breakwater was thought to be as immovable as the natural rock; yet the resident engineer saw it slowly yield to the force of the waves, and swing round into the less troubled water inside the pier. It gave way not in fragments but in one mass, as if it were a monolith. The displaced mass is estimated to weigh about 1,350 tons.

Strength of Slate.—MM. Blavier and Brossard, mining engineers, have studied the comparative resistance to rupture of the Angers slates, marble, and Tonnerre stone. The experiments were made with slabs of about 1 metre (39 in.) long, .15 (5⅞ in.) to .5 (19⅝ in.) metres wide, and .008 (⅜ in.) to .05 (1⅞ in.) metres thick. The rupturing load P was weighed, and the co-efficient of rupturing resistance R was calculated by the formula:—

$$\frac{P\,(b-a)}{4} = \frac{R\,l\,c^2}{6}$$

in which l is the distance between the supports, b the breadth of slab, c its thickness, and a the breadth of the fedges. The following mean values were found for R: for slate cut lengthwise, 5,021,000; slate cut crosswise, 2,733,080; marble, 1,140,000; Tonnerre stone, 630,400. Slate has the added advantage of being easily split into slabs, while the other stones require the use of a saw.—*Annales des Ponts et Chaussées.*

Engraving on Glass by Electricity.—M. G. Planté covers a surface of glass or crystal with a concentrated solution of nitrate of potash, by simply pouring the liquid on the plate, placed horizontally on a table or in a shallow dish. In the liquid film and along the borders of the plate he lays a platinum wire communicating with the poles of a secondary battery of fifty to sixty cells; then holding in his hand the other electrode of platinum wire, surrounded except at the end by an insulating sheath, he touches the glass covered by the thin film of saline solution, at the points which he wishes to engrave. A luminous notch is made wherever the electrode touches, and, however rapidly one writes or draws, the marks are found sharply engraved on the glass. In writing or drawing slowly, the marks are engraved deeply; if the wire which serves as electrode is sharpened to a point, the lines may be made extremely fine. Either electrode may be used as a graver, but a weaker current suffices for the negative electrode. Although these results have been obtained by using secondary batteries, it is evident that any other source of electricity of sufficient quantity and tension might be employed for continuous work, such as a Bunsen pile of a sufficient number of elements, or a Gramme machine, or even a magneto-electric machine with reciprocating currents.—*Comptes Rendus.*

Hissarlik.—The *Times* says Dr. Schliemann has secured a new firman, and intends to renew his excavations at Hissarlik as soon as it is safe for him to work in the country.

The Baths of Diocletian.—Recent excavations in the Baths of Diocletian have brought to light a Christian chapel (*oratorium*). The apse is ornamented with a mural painting of Christ and the twelve apostles, below which, in panels, are smaller representations of Biblical subjects. According to the decision of Rossi, they were executed between the years 300 and 400.

Mexican Antiquities.—At a recent meeting of the St. Louis Academy of Sciences, Mr. J. A. Daeus presented drawings of the ruins of a vast palace at Xayi, Chiapas, Mexico. Some discoveries have just been made in the subterranean portions of this ruin. It is supposed that a library has been found, perhaps of sacred writings, which are contained upon a very large number of tablets, each six by eight inches in surface and half an inch thick. The material is spoken of as terra-cotta. The inscriptions appear to be in a language possessed of an alphabet, but they have not been translated.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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THE struggle over the Philadelphia Public Buildings develops, but does not decide itself. The dead-lock, however, seems to be loosening. Some time ago the Commissioners offered to pledge themselves that if the Councils would appropriate six hundred thousand dollars to continue work during 1878, instead of half a million as first provided, they, the Commissioners, would not trouble them with any mandamuses or other demands for money during the year; and accompanied this proposition with an agreement from the Messrs. Struthers not to demand in 1878 any sum beyond what the Commissioners should allow them out of this six hundred thousand. In the mean time the clause in the new constitution, which prohibited any municipal commission from incurring debts or making contracts on behalf of any city till appropriations had been voted therefor by its municipal government, had been relied on by the Councils as an effectual restraint upon the Commissioners from compelling any expenditure against the desire of the Councils beyond the contract already made with the Messrs. Struthers; and the decision of a lower court against a writ of mandamus upon the Councils, applied for by the Commission, sustained this reliance. But a decision of the Supreme Court (two judges out of seven dissenting) has lately reversed that of the lower court, and made the mandamus peremptory, ruling that the constitutional clause, though it takes away from the Commissioners the power to make contracts and incur debts in advance of appropriations, leaves them the authority, conferred by the act which appointed them, to demand and compel what appropriations they see fit. In truth, it can make little difference to the city government whether the Commissioners have power to bind it by contracts and then call for appropriations to satisfy them, or to compel the appropriations and then make contracts accordingly. On the strength of this decision the Councils have appropriated the six hundred thousand dollars proposed by the Commissioners for this year, and have with great unanimity passed an order appointing a joint committee to go to Harrisburg and urge the abolition of the Commissioners themselves.

THE law of ancient lights has been under discussion in the English building journals for a good while past. In a country where all vested rights are so jealously guarded, and where nature is chary of light during much of the year, it is natural that the possession of it should be maintained with zeal; and that the present activity in rebuilding large cities with buildings denser and higher than the old should lead to many quarrels between those who build and their neighbors. So rigidly, indeed, is the established access of light, even across streets and yards, guarded from interference, if we may judge from the English papers, that it would almost seem that the law of lights had been established for the express persecution of architects. It is carried so far, in fact, as to become an oppression which would here be considered intolerable; for a person may, as one writer instances, by going into an unoccupied region on the outskirts of a growing town, and covering a small lot with buildings, in a few years obtain by prescription a dominant right over the neighboring owners, which will make their land practically unavailing for building purposes, and so to all intents destroy its value. It would even seem that English jurisprudence is drawing the restraints of the law closer and closer in this respect, till the conflict of interests is likely to call for legislation. In the United States, on the other hand, the law of ancient lights is falling into desuetude, it is said, a natural consequence of its incompatibility with the conditions of modern society. Cases in the courts are few, and the judges grow more lenient in the application of the law; in fact, its severities are almost forgotten. In a country, too, where the atmosphere is usually clear, and the light strong and unclouded, the question of easement of light would probably never have acquired the importance that it has in England. A story is now going the rounds of the daily press, to the effect that a dealer has lately brought suit against a city for widening the street on which his property abutted, as by so doing the plaintiff's shop was made shallower by some twenty feet; the claim for damages resting in the fact that the changes made the plaintiff's shop so light that it damaged the sale of his goods, whose quality was such as to demand a dark place for their exhibition.

A SUIT was lately tried in England, and mentioned in the last *Architect*, where the defendant claimed that as the plaintiff's building was used as a police-house and cook-shop, sufficient light reached it for such an establishment. The Lord Chief Justice did not take this view, and the jury gave substantial damages for the plaintiff. The case was taken before the Court of Queen's Bench, where the judgment for the plaintiff was unanimously upheld. The law governing such cases as at present understood is well expressed in a recent decision of Mr. Justice Fry: "Access"—access being the word used in the Prescription Act, which governs such cases—"of light may be described as the freedom with which any light may pass through a certain space over the servient tenement. The aperture, in other words, is the measure of the access of light." Modern law therefore regards not merely a particular window, but the total amount of light enjoyed by the dominant tenement. In the case in question, as in similar cases, the defendant submitted the plea that the plaintiff was in part compensated for the loss of direct light, by the increase in the power of the reflected light,—a plea which fell flat because it has been decided that a tenement is entitled to have light of the same nature it has always had, and need not put up with reflected light as a substitute. As the rulings at present stand, they are wholly in favor of persons who possess the easement of light; and they may exact considerable damage for infringement on their right, or may even cause the obstructing buildings to be pulled down.

WE have more than once mentioned the Society of Decorative Art, instituted and supported by the ladies of New York. This has been at work for a year or more, and the results have been to a degree satisfactory. A society to be known as the Auxiliary of the New York Society of Decorative Art has been formed lately in Boston, which is to provide for the amateur artists in that neighborhood the advantages that are enjoyed by those who live near New York. The society differs in several points from its prototype, to which, by the way, although auxiliary it is not subordinate. The management of affairs is vested in committees, whose members belong to both sexes, a fact of itself which guarantees a more effective activity. As it is not at present proposed to establish any classes, the society will content itself with opening an establishment which will be part museum, part salesroom, and part intelligence-office, and such a place in a very central situation the society has acquired rent free; here the work of amateurs can be exhibited and sold, and here information as to materials and processes can be obtained. No work will be admitted that has not received the approval of the examining committee; and things that have been approved by either the Boston or New York society will be received at the rooms of the other without further inspection.

The use and value of such an organization depend on the standard of work it sets up, and this again depends mainly on its examining committee. If they insist on quality rather than quantity, and reject all work that has not real excellence, they may do good service, and improve the average of decorative work, as well as encourage the best. If they temper their judgment to the weakness of amateur skill, they may make their undertaking popular, and a commercial success; but this will be of very little public service, and the power of the organization to do better things will be thrown away. As a mere commercial undertaking, such an elaborate special machinery is superfluous. The ordinary course of trade will sufficiently provide for it. There is enough and to spare of decoration nowadays; and for the average of it, it were better to devise means of keeping it at home than of opening a market. We are led to say this because we understand that the New York Society has lessened its efficiency in just this way. Concession to a supposed expediency led to lowering the standard at first established, till the artists who once composed the examining committee lost heart and fell away, leaving the conduct of this part of the work to successors of more accommodating tastes. If a society of decorative art were a necessary thing, to be kept alive at a sacrifice, this might be reasonable. But such a society is not a necessity. Decorative art needs no encouragement: it needs direction, criticism, and the discrimination of the good from the mediocre. In this there is a field for such a society, and a chance to commend its existence by a useful influence. In this view, professional advisers have an advantage over others, in that their professional position gives them independence. A non-professional committee, apart from the question of fitness, is exposed to a great many influences, social and personal, which are a great embarrassment to the earnest and conscientious, and from which the professional censor is by his position more or less secluded; a consideration which we think was not sufficiently taken into account in the New York Society. We doubt if any thing more than a pecuniary success, and that temporary, can be secured for a society that takes the ground of compromise; but if the Boston one takes and holds a really high stand, it may do a valuable work. Artistically there is enough to do in discriminating what is good; and financially we suspect there will always be a reasonable demand for what is set aside as really the best that is to be had, though the supply may be small.

The labor troubles are far from having reached a settlement. Small strikes are going on in Burlington, New Haven and elsewhere, while those in Cincinnati may at any moment assume considerable importance. There the Socialistic Party, to the number of some three thousand, paraded the streets on the 10th inst., with banners bearing such devices as "Labor creates all, therefore labor should have all," and "Those things that man did not create should be man's in common." If these two very contradictory statements could be reconciled, we think it would be uncommonly pleasant to be a laboring-man. No disturbance occurred; but as the red flag was shown at various points, the police were kept in readiness to quell any outbreak. At the meeting after the parade, the speeches, which were of a decidedly red character, were more particularly directed against the eight-hour law, now before the State Legislature, concerning which it was said that as it made the working day eight hours long for employés on State work, while laborers under private contractors were left to make their own terms, it could be only an "electioneering dodge." The following resolutions, among others of a like nature, were passed: —

"*Resolved*, We demand that a law be passed that will make it a criminal offence for any private employer to permit a laborer to work longer than eight hours per day in said employer's service.

"*Resolved*, That the Senate Bill No. 8, which permits the employés of private contractors to contract to work longer than eight hours per day, justly damns the bill as a transparent piece of demagogism."

What was the cause or the upshot of the communistic meeting in St. Louis, on the 11th inst., we have not seen stated; but the red flag was openly paraded, and inflammatory speeches were made. In New York the French Communists held a meeting March 17 in aid of the widows and orphans of the Commune, and the Communists transported to New Caledonia. In this there is nothing to be noted, except that there is in New York an organized body of communists who give each other the title of "citizen." But perhaps the most significant event is the triumph of the working-men in California, who, in the three cities heard from, have elected all but three of their candidates. It is customary to assert that the country has nothing to fear from open and avowed communism; but with such a success of the working-men — whom the late riots, strikes, and disturbances prove to be willing to join hands with the real communists — following hard upon the disturbances and riotings of Kearney's followers in San Francisco, we find it hard to believe that it is well, simply because of sentiment, to let communism thrive in our midst.

There will be "nuts" for contractors if the House of Representatives passes the bill introduced by Mr. Schleicher of Texas. Mr. Schleicher, struck by the bad economy of the way which now prevails, of doling out appropriations for public buildings which are insufficient to carry the work on promptly, or of stopping work altogether for want of appropriations, and noticing that while the buildings linger the Government is paying a million dollars a year for rent in temporary quarters, has devised a remedy. He proposes that the Government shall borrow twenty millions at five per cent, and pay its million in the form of interest on this loan, using the principal to finish all its buildings in the course of a year, and establishing a sinking fund for the gradual payment of it. The bill is reputed, says the New York *Herald*, to be in favor with Congressmen, who desire to please their constituents; but we should incline to doubt both its efficacy and its economy. The difficulty of administering such an amount of work so pressed would, under the present system, be enormous; and to think of finishing it in any thing like a year would be preposterous. To set it actively in progress would give a great stimulus to the building-trades, certainly; and as far as cheapness goes, the present would be as good a time to build as the Government would be likely to find. But to fancy that this would be the end of it, would be very sanguine. The hunger of constituencies for public improvements is not so easily appeased. We imagine more mouths would be opened than would be closed by the bill, and the Government would find that the price of building would not keep its present level very long.

ARCHITECTURAL RESTORATION.

We have spoken before this of the debates concerning architectural restoration, which have been lately aroused in England, and have, in fact, grown into tolerably lively quarrels now and then. We have called attention to Mr. Stevenson's controversy with the restorers of his country's cathedrals, Sir Gilbert Scott at their head, and to Mr. Ruskin's witness of the uncleanness of the bread by which they live (*American Architect*, Nos. 80, 81); and last week we quoted part of a letter from Mr. Moore, describing a process which is specially characteristic of Italy and France, where smugness is apt to be considered an essential part of architectural effect.

On the general question of restoration, it is doubtful whether even thoughtful people can ever be brought to entirely agree. The debate which has been stirred up about it in England still continues. At a meeting of the Architectural Association last month, it was resumed with animation, and Mr. Stevenson bore witness against it with the same spirit as before. "I venture to affirm," he said, "that this generation has, mainly by its restoration, marred, altered, and destroyed more historical monuments than any previous three centuries put together. We have revised and rewritten in our new handwriting, copying as well as we could the old characters, every old record we could lay our hands on. I do not think posterity will thank us; rather, I expect their curses on us as self-conceited destroyers of the records of our country and history." There is no doubt that modern restoration has been in great part inconsiderately, irreverently, and even shamelessly done. But the question is not merely what has been done, but what shall be. Here the architect will perhaps always differ a little from the painter and the antiquarian. Mr. Ruskin may represent one extreme of

opinion; as the scourer of the Duomo at Florence, and the French restorers, who, not content with furbishing up the Cathedrals of Paris and Angoulême, have scored them within from end to end with clean black mortar joints against the white stone, represent the other. It is probably true, as Mr. Moore says in the letter from which we have quoted, that "few persons in Italy care any thing for the beauty of their old art." Mr. Ruskin somewhere speaks of having seen the restoration of a horse in one of Veronese's pictures undertaken with a pot of white paint and a large brush tied to the end of a long stick. But there is a difference among restorers; and men who have been indiscreet or mischievous in one place have in another stayed their hands with respect. M. Viollet-le-Duc and Sir Gilbert Scott have excesses to answer for; but to say that they have "extensively defaced, if not destroyed, nearly all the French cathedrals" and the English as well, is to make an accusation that it would be very difficult to sustain.

It is inevitable that in an age which is marked at once by great antiquarian interest and great enterprise in building, such controversies should occur, especially when the antiquaries and the builders are mostly different persons. It is the more natural in an age when, in spite of its architectural activity, there is no general current of style and feeling strong enough to absorb all interests, but instead a wide eclecticism, and discordant personal preferences; and still more in an age which is exceptionally characterized by the fondness for the picturesque and the romantic which accompanies its preference for landscape in painting, and for the charm of association. It is this last characteristic which more than the others distinguishes our age from all that have gone before it. There probably never was a time, till ours, when the adventitious, pictorial beauty which monuments owe to time and exposure, would have been put into competition with their worth as objects of architecture and of utility. It is this feeling which has imported a new element and infused acrimony into the discussions, leading them insensibly away from the question of purely architectural preservation. It is behind this feeling that the absolute opponents of all restoration really intrench themselves; and it has confused the discussions, because, so far as we see, no attempt has been made to discriminate it from a pure zeal for the conservation of architecture.

There are two very distinct sources of interest in any old monument. One is the human design and work of it; the other the marks which time, weather, and use have left upon it, with which we may include the associations of history which cling about it. As a building grows old, stains and marks of disintegration gather upon it, which add to it a delicate charm, and at first unite with its design in a harmonious effect of increased beauty. To these are to be added a good deal which is simply dirt, and the marks of abuse, but which the beneficent influences of sunlight and atmosphere translate into adornments that if not too curiously scrutinized have their own attractiveness and lend themselves to the general effect; but at length these additions and subtractions overlay the original design of the building and obscure it. It is no longer primarily an architectural object, but a pictorial or historical one. The point at which a building ceases to be a piece of architecture and becomes a picture or a relic, and the degree in which these things are combined in any given building, will not be easy to determine, nor are people likely to agree upon them. But it should be remembered that the effect of time and use is after a while distinctly destructive of architectural quality, and this consideration should not be put out of court in judging the question of restoration. An architect naturally thinks of it first, but the painter and the lover of the picturesque subordinate it or forget it. The sensitive architect is not obtuse to the beauty which age gives to material. He would build his structures of stones that wear it if he could find them shaped to his hand, and when he finds it in buildings that already exist he will save it if he can. But to him the human design in a building is the chief thing, and when he finds that this is getting effaced from it he is apt to think the restitution of it the first thing to be done in taking care of the structure. The restitution can usually be made with security in most respects if the degradation of the original work has not gone too far. Proportion, outline, grouping, the adjustment of detail, may be accurately preserved if the restorer's hand is not too long delayed. Wherever there is a piece of a moulding left it may be accurately restored. So long as any part of the work exists, such as its sculpture if it be good, which owes its life to the marks of the workman's hand, or any material which honorably holds its form and is serviceable, the reverent restorer will preserve it tenderly; nor will he be in haste to set his own new work against it, unless where it is necessary for what he will consider the greater gain of maintaining a perishing design. But while the architectural design is dominant and is valuable it deserves to be upheld against the encroachments of decrepitude and the loss of its essential elements. As a question of art, the idea of a building, when it can be unquestionably made out, is superior to its materials, and the whole to the details.

Here is a point, we think, where the opponents of restoration are very apt to sacrifice the greater to the less, to let the design perish for the sake of the material, and the whole for the sake of the details. We may reasonably protest against the kind of reverence for art that would let the high gables crumble away from an old façade or its lines of moulding weather into shapeless flatness, rather than have its time-stained face temporarily spotted with fresh stones or lay the profane hand of the modern stonecutter upon it. We are not arguing against the maintenance of old monuments out of archæological interest or historical reverence. These are considerations apart, to be separately determined in every case. We maintain only, that when the question is argued on the ground of art, one kind of considerations, and those the larger, should not be ignored for another, and it is doing no honor to a designer of old time to let the outline, disposition, and subordination of his design fade away for the sake of leaving in honored isolation details which, precious as they may be to us, existed in his mind only for the sake of the whole.

Where a monument is so far degraded that its original form cannot be clearly shown, there is an end of restoration; nothing but conservation or replacement is possible: only, let us realize that there is degradation. When the historical interest has become superior to the artistic, the case of restoration is closed also; but it is well to distinguish between what is the history of art, and what of temperature and moisture, and not to be too great a stickler for the undecipherable meteorological record when the artistic one has mouldered away. Again, there may even be a question between the accidental picturesqueness of age and the artistic beauty of design. But all these questions are aside from the quarrel of those who oppose restoration out of reverence for the old work that is restored. One may be disposed to condemn unsparingly those who willingly sacrifice old work that is good, or the vulgar indignity of scouring and hammering into freshness that which can be preserved, for the sake of making it look new; but it is difficult to share the feeling of the many who would cherish the letter at the cost of the spirit, and who would tenderly guard a decaying monument from the restorer's touch, till the imprint of the design that gave it life had mouldered into hopeless oblivion, as the Egyptians did their mummies, or as maidens do the corpses of bouquets.

PAPERS ON PERSPECTIVE.

VI. — THE POSITION OF THE PICTURE. — THE OBJECT AT 45°. — THE MEASUREMENT OF INCLINED LINES.

In the last paper we saw how, when the real length and direction of the lines by which an object is defined are known, the real length and direction of their perspectives may be exactly ascertained. But our investigations covered only the cases of lines parallel to the plane of the picture, whether horizontal, vertical, or inclined, and of horizontal lines inclined to the picture. It remains to find out how to apply a scale to lines inclined to the picture, that are not horizontal, such as the lines of the gables, and of the hips and valleys of roofs.

102. Plate V. shows how this is done, and at the same time illustrates some other points of interest. In this plate, as in the previous plate, we have at the side a plan, on a small scale, illustrating the relative position of the spectator at the station-point S; of the object, at A; of the plane of measures, at *m m*; and of the plane of the picture, at *p p*. In the present plate the position of the object at A, and of the spectator at S, is the same as in Fig. 11; but the position of the plane of the picture and of the plane of measures is changed, their previous position being indicated by dottest lines. Their position is now taken so that the centre at C, and the vanishing point of 45° at V^{45}, coincide. That is to say: the

principal lines of the building, R and L, at right angles with each other, are now at 45° with the plane of the picture, and consequently with the plane of measures; and the line X that divides the angle, making 45° with each, is accordingly at right angles with the picture and plane of measures, and coincides with the Axis. V^x then, of course, comes in the same place that C does.

103. Now in the first place this illustrates the point, that, the position of the spectator and of the object being given, it is purely a matter of convenience how we take the plane of the picture, and in what direction its axis is drawn. In Plate IV., Fig. 11, the axis was directed towards the end of the house, C coming near the corner, and the left-hand side of the house was less inclined to the plane of the picture than the right-hand side. In Plate V., Fig. 14 and Fig. 15, the axis is directed further to the left, C coinciding in position with V^x, and the plane of the picture and plane of measures are equally inclined to both sides of the house, making 45° with each. But of course this would not change the appearance of the object A, as seen from S; and if the drawings were both made so as exactly to cover and coincide with it, the two representations would look exactly alike when viewed each from its own station-point, so far as concerns their main outlines. These are not affected by the alterations and repairs the house has undergone since we last saw it. But its position as seen in Fig. 12 is not exactly the same as that shown in Fig. 11, as it was intended to be and as the text implies (101). It is about ten feet farther to the right. For the two figures entirely to correspond, the point V^x in Fig. 12 should be near the window, as in Fig. 15, which is consistent not only with Fig. 14, but with Fig. 11 also.

104. In the second place, the plate illustrates the point that it is a much simpler thing to make a drawing in perspective when the plane of the picture, as in Fig. 15, is at an angle of 45° with both sides of the object than when it lies accidentally, as in Fig. 13.

For this attitude of the object sets the station-point at its maximum distance from the picture, which is obviously an advantage. This distance, S C, is in this case just half the length of the Horizon between V^n and V^v. Moreover, since S is equidistant from these points, and C, which is also V^x, is half way between them, it follows that D^x coincides with V^n, and also that there is another D^x coinciding with D^v; that D^n and D^v are also equidistant from C; and, in short, that the whole series of vanishing points and points of distance is symmetrical about T P P' in one direction, as it is about the Horizon in the other.

105. From this symmetry, which is clearly exhibited on a small scale in Fig. 14, it follows that V^n and V^v are equally distant from the Horizon, that T L M is parallel to T R N', and T R N to T L M', and hence that V^o and $V^{o'}$, which lie at the intersection of these traces, are at an infinite distance. Hence Q is parallel to T R N and T L M', Q' is parallel to T L M and T R N', and the projections of these lines in the perspective plan are parallel to the Horizon.

106. The great convenience of this is shown in Fig. 15, where the hips of the roof of the schoolhouse on the left, that form its outline against the sky, are drawn parallel to the traces of the planes in which they lie, instead of being directed, as in Fig. 13, to their inaccessible point of intersection.

107. It will be observed that the relation of the principal distance points D^n and D^v to their corresponding vanishing points, V^n and V^v, is the same as that of the corners of an octagon to the corners of the square from which it is cut, the distance of each from the remoter corner being half the diagonal of the square. Compare Fig. 16 with the small plan in Fig. 14. The distance apart of the vanishing points then being as 200, the distance of the station-point from the picture at C will be as 100, and each point of distance will be at a distance of 141 from its own vanishing point, and 59 from the other. Or, in other words, the distance apart of the vanishing points being as 10, that of the points of distance from the centre, C, will be as 2, their distance from the nearest vanishing points will be as 3, their distance from each other will be as 4, and the distance of the spectator from the picture as 5, very nearly.

108. Fig. 17 shows the amount of the error involved in this assumption. It is so slight, that for practical purposes the distance apart of the points of distance may generally be taken as two-fifths of that of the vanishing points, when the picture is at angles of 45° with the sides of the object.

109. Fig. 15 also illustrates another point of capital importance, showing how dimensions are laid off by scale upon lines lying on the *hither* side of the plane of measures; these lines are necessarily drawn to a larger scale than that used for lines in that plane, just as lines beyond it are drawn to a smaller scale. The principle of the isosceles triangle, explained in the last paper, and again illustrated in Fig. 14, still holds good. The fence, for instance, that is built out from the front corner of the house, toward the right, has the position of its posts laid off upon the line of horizontal measures, or ground line, *g l*, to the right, by scale, and then transferred to the line of the fence in the perspective plane, by parallel lines drawn to D^v, the fence being in a line with the left-hand side of the house. These lines diverge as they come forward, and the scale of the fence is obviously increased. The building on the left is entirely in front of the plane of measures.

110. To avoid confusion the points on the ground line intended for use beyond the plane of measures are indicated above it, and those which give the dimensions of objects this side of it, as is the case with this fence, are indicated below it. A better way in some cases is to have separate ground lines, for figures in front of the plane of measures.

111. Let us now take up the question left unanswered in the previous paper, and see how dimensions can be laid off by scale upon inclined lines; upon lines, that is to say, which like the gables and the hips and valleys of roofs lie in inclined planes, and are inclined not only to the plane of the picture but also to the horizontal plane.

In the first place it is clear that just as every horizontal plane has a line of horizontal measures, or ground line, where it intersects the plane of measures; and as every vertical plane has a line of vertical measures, which is its line of intersection with the plane of measures: so every such inclined plane, as for example a roof, in like manner has its own line of measures, lying in it and also in the plane of measures, upon which dimensions can be laid off by scale. It is the line in which that plane intersects the plane of measures, and it passes through the point at which any line in that plane pierces the plane of measures. This line and its perspective are always parallel to the trace of the given plane. For, as we have seen (78) this trace is the intersection of the plane of the picture with a plane parallel to the given plane, and passing through the eye, while the line of measures is the intersection of the given plane with a plane parallel to the picture. The intersections of these two sets of parallel planes must be parallel.

112. To find a line of real measures in any plane, then, it suffices to find the point at which any line in it pierces the plane of measures, and to draw through this point, when found, a line parallel to the trace of the plane.

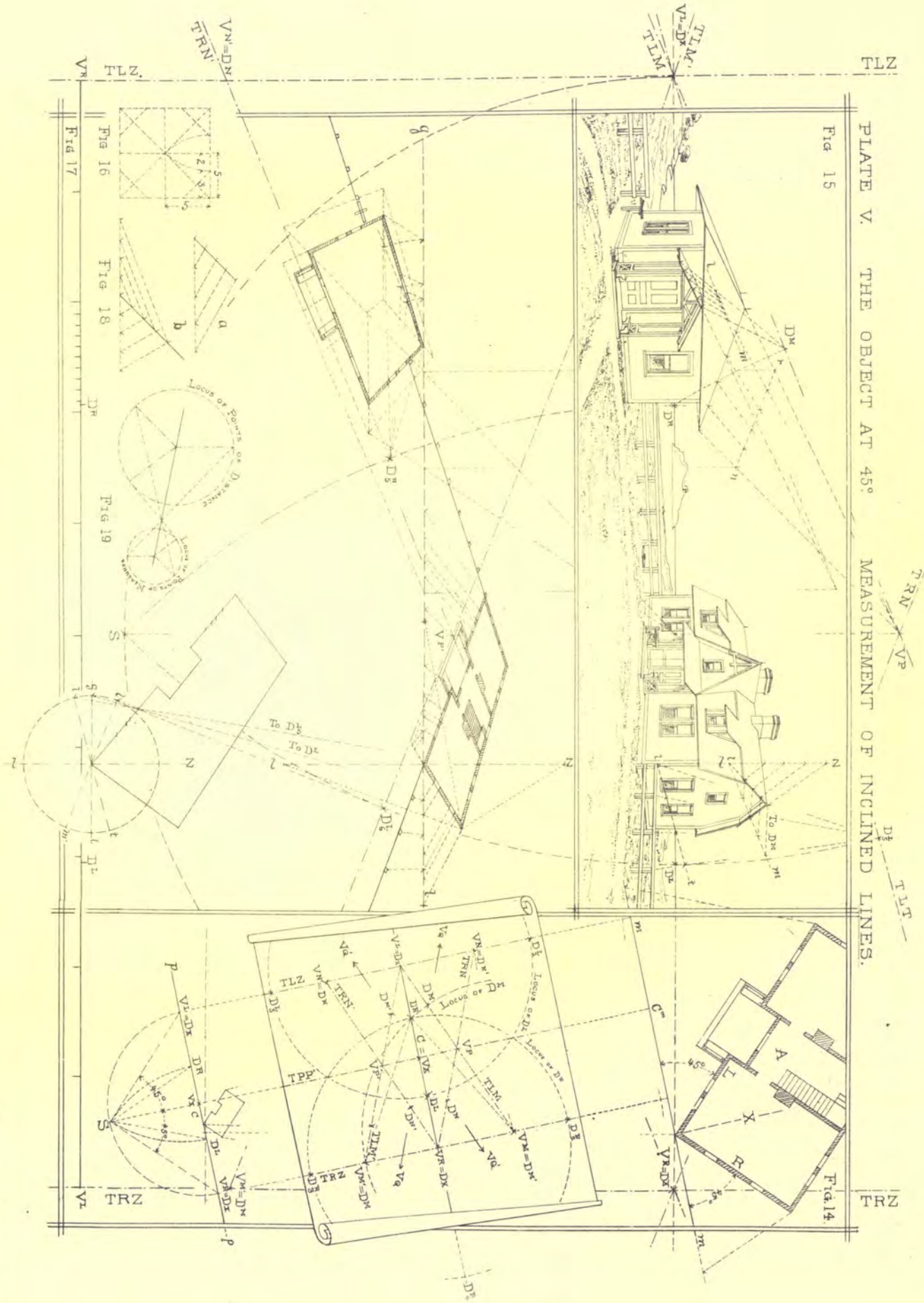
113. In Fig. 15, for example, we have several such lines: *g l* parallel to the Horizon; *l m* parallel to T L M; *n r* parallel to T N R, etc. In the case of the ground line, the horizontal lines to be measured off are prolonged until they reach the plane of measures, and the line *g l* is drawn parallel to the horizon through the point thus obtained. In the case of the inclined lines of the gables, that on the end of the building at the right is brought forward till it touches the plane of measures, and the corresponding line on the porch roof of the porch of the little schoolhouse on the left is carried back until it reaches the plane of measures. These points are ascertained from the perspective plan, the point where the horizontal projection of these inclined lines pierces the plane of measures being the projection of the point where the lines themselves do so. The lines of measures *l m* are then drawn through the points thus ascertained parallel to the trace of the plane L M. As these gable lines lie also in the vertical planes R Z, vertical lines of measures, 'Z, parallel to T R Z, may also be drawn through the same points.

114. In the case of the hip line Q, of the little schoolhouse, which is parallel to the plane of measures and to the trace T R N (105), it is necessary to proceed as in the case of vertical lines, or any others that are parallel to the picture, and carry across it a line lying also in the plane R N, but inclined to the picture, by means of which the line where the plane intersects the plane of measures can be found. In the figure the line of the other hip, P, is used for this purpose, its horizontal projection being found in the perspective plan. It would have done just as well to prolong the line of the eaves until it met the plane of measures, and to draw the line *r n* through the point thus found.

115. All these lines of measures lie in the plane of measures, and are consequently drawn to the same scale. On all of them one-sixteenth of an inch is the true perspective representation of one foot, and any dimensions laid off on this scale can be transferred to any other lines in the inclined plane, such as the lines of the gables, by means of points of distance lying in the trace or horizon of the inclined plane, just as dimensions can be transferred from the ground line to lines lying in the horizontal plane by means of points of distance taken on the Horizon.

116. The points of distance upon these inclined traces, or horizons, are easily obtained from those upon the horizontal Horizon, if we may use such an expression. It is obvious indeed that the problem is a simple one, if we remember that the point of distance corresponding to any vanishing point is found by setting off upon the horizon passing through that point the true distance of that point from the station-point. If this is done, the triangle S V D formed by the three points will, of course, always be isosceles, by construction. Now, the distance of every vanishing point from the eye is known, and can readily be laid off on all the traces, or horizons, that pass through it.

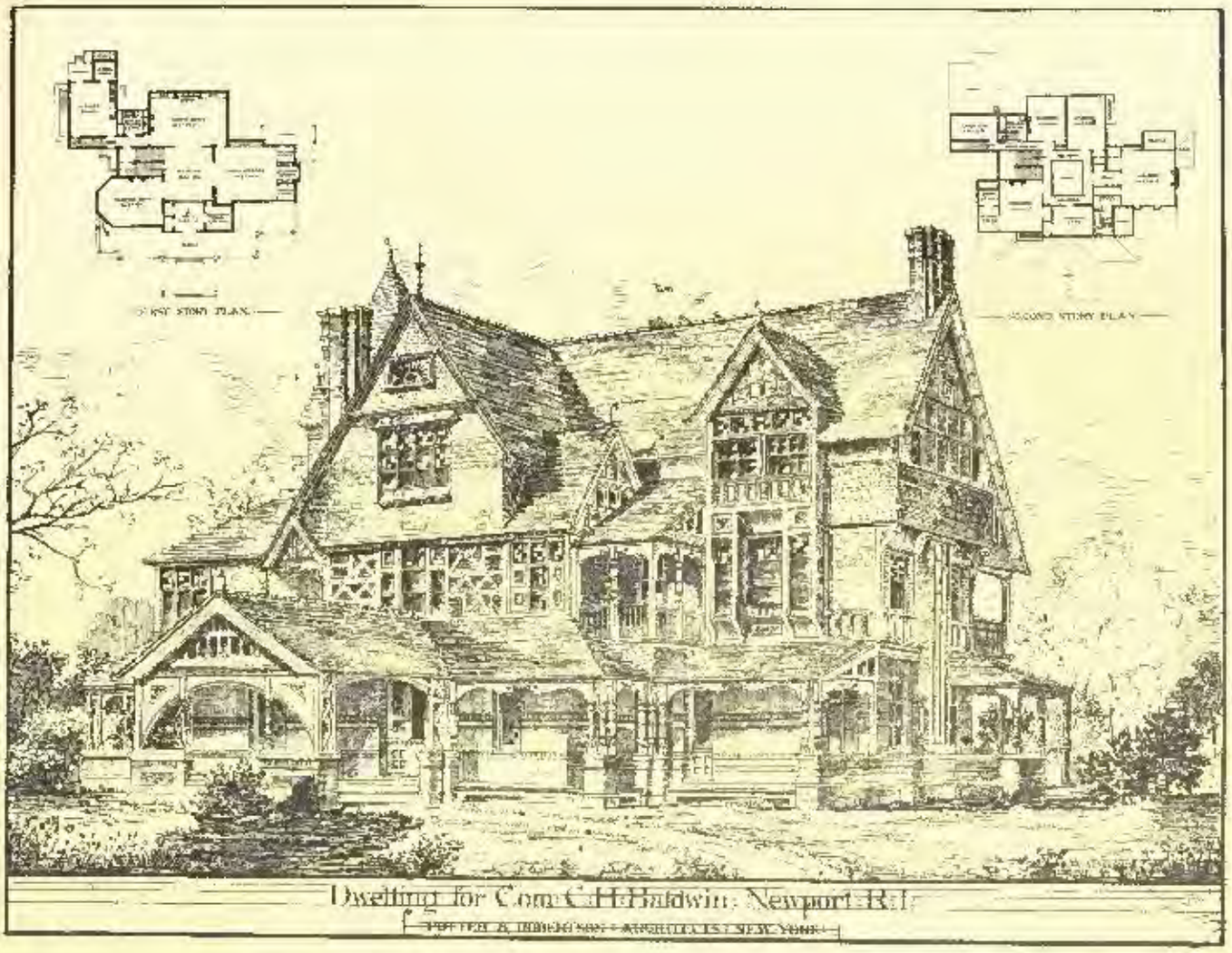
117. The distance of V^n from S, for example, is known to equal $V^n D^n$, and this distance laid off on T R N, T R N', T R Z, and the traces of any other planes that contain R, give the corresponding points of distance on those traces, D^n_2, D^n_3, D^n_4, etc., all, in fact, lying at equal distances about V^n on the circumference of a circle whose radius equals $V^n S$, the distance of the vanishing point in question from the eye. This is shown both in Fig. 14 and in Fig. 15. In like manner a circle may be drawn about V^x, containing the



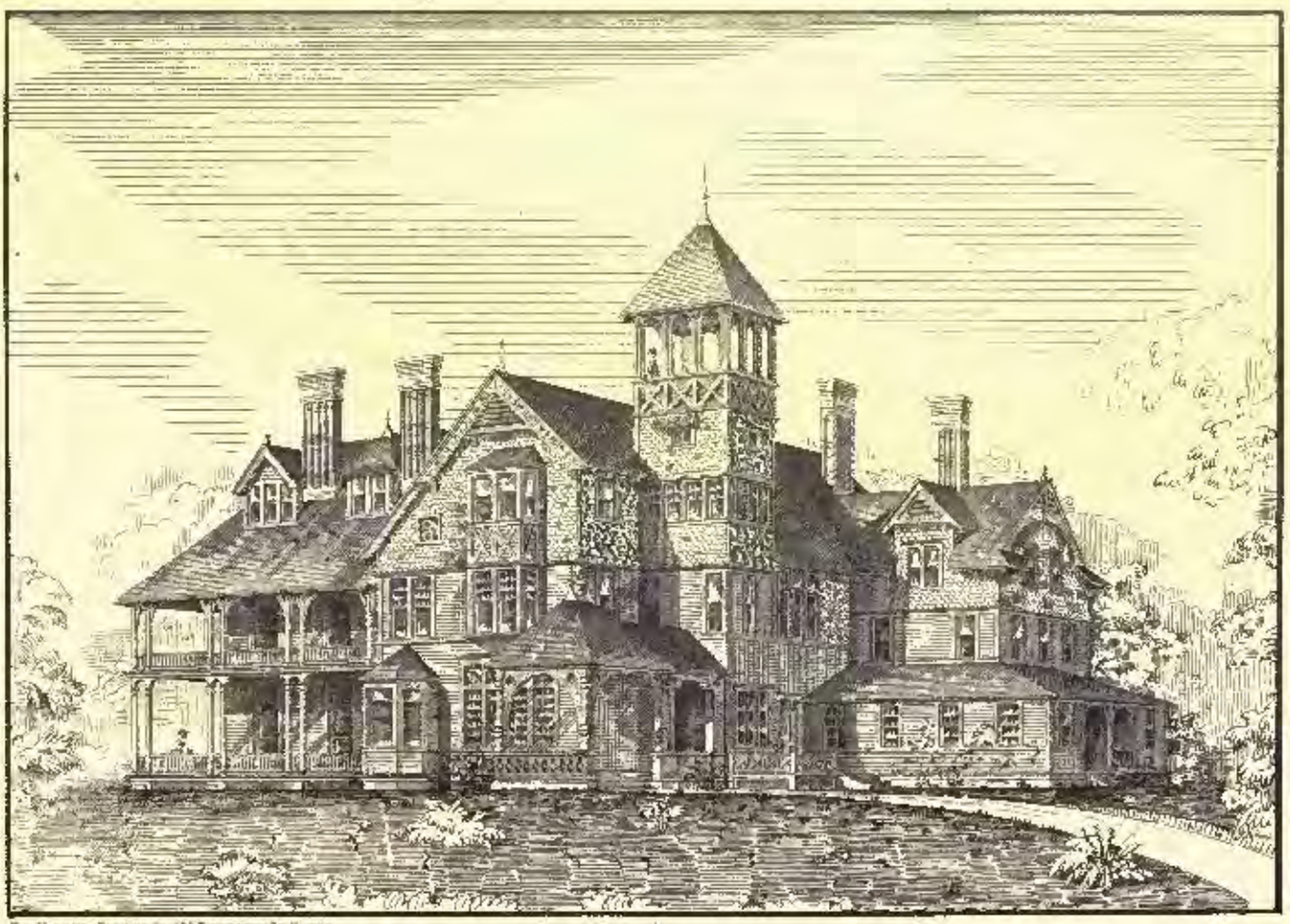
THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST. BOSTON

— STORE ON FRANKLIN ST. BOSTON —

— MESSRS CUMMINGS & SEARS ARCHTS —



Dwelling for Com. C. H. Baldwin, Newport, R.I.



THE BOSTON PHOTOTYPE CO. 283 DEVONSHIRE ST. BOSTON.

DESIGN FOR A COUNTRY HOUSE.
G. E. HARNEY, ARCH'T.

VIEW OF INTERIOR
NEW CATHOLIC CATHEDRAL
QUEENSTOWN
G. C. ASHLIN

distance points that belong to that vanishing point. Its radius will be $V^L D^L$, the distance of V^L from the eye.

Such a circle is the *locus* of the points of distance.

118. The distance of V^R from the eye is $V^R D^R$, as is obvious if we suppose the triangle $V^R D^R V^L$ revolved back around its side T R Z until D^R is at S again. A circle drawn around V^R, with $V^R D^R = V^R S$ as a radius, will accordingly give points of distance, by which any inclined line M, vanishing at V^R, may be measured off by lines of measures lying in any of the planes that contain it, and whose traces accordingly pass through V^R.

As we have taken the lines M and M' at an angle of 30° with the Horizon, the angle $M D^R M'$ is 60°, the triangle $M D^R M'$ is equilateral, and D^L falls upon $V^{M'}$, and $D^{M'}$ upon V^M.

In every case, of course, the line of real measures, like the lines of proportional measures discussed in a previous paper, is drawn parallel to the trace of the plane containing it (76).

119. It will be noticed that there are two points of distance on T L Z, at equal distances above and below V^H, just as we found that both V^R and V^L would serve as points of distance to V^R. Either of these can be used instead of D^R to set off given lengths on the right-hand horizontal lines. In the upper perspective plan, for example, the length of the right-hand side of the house is set off not only on the ground-line and transferred by means of D^R, but also on the vertical line of measures, both above and below the ground, and transferred by means of D^R_2 and D^R_3, giving in every case the same points.

Indeed, it is practicable to have a second point of distance on all the traces, beyond V^R. They would be the vanishing points of the bases of *obtuse-angled* isosceles triangles. Such a triangle is shown in Fig. 19, *b*. Its employment is shown in the upper perspective plan, where the length of the right-hand side of the house is laid off by scale on *g f*, to the *left* of the corner, and transferred to the perspective line by means of the point D^R_4, which is off the picture.

120. If, then, through the point at which any perspective line pierces the plane of measures, a line of measures be drawn parallel to the trace of any plane that contains the line (that is to say, parallel to any trace passing through the vanishing point of the line), any distance laid off by scale on the line of measures may be transferred to the perspective line by means of a point of distance in that trace; and this point of distance will be the point where that trace is cut by the circle, which is the *locus* of the points of distance, a circle whose radius equals the distance of the vanishing point of the perspective line from the eye, and whose centre is at the vanishing point.

This is illustrated in the lower perspective plan, in which a certain distance, being that from the corner of the house to the further edge of the window, is laid off on several lines of measures, *g f*, *l z*, and *l m'*, parallel to the several traces that meet at V^L. Lines drawn to the points D^L on those traces all give the same point upon the line L.

121. As the points taken upon the line of measures are all equidistant from the corner of the plan, they lie in the circumference of a small circle, which is the *locus* of the points of measures, just as the corresponding points of distance lie in the circumference of a large circle, and we have the curious phenomenon of lines drawn from certain points on the small circle to corresponding points on the large one, all intersecting at the same point, upon a line joining the two centres. But Fig. 19, which presents these geometrical relations in a diagram, shows that there is nothing surprising in this.

122. Now just as any line drawn in any direction, at random, through one end of a perspective line, may be used as a line of proportional measures (81), so any such line that lies in the plane of measures may be taken as a line of real measures; and any dimensions taken upon it by scale may be transferred to any perspective line that touches it, by means of a trace drawn through the vanishing point of the perspective line, parallel to the random line; the point of distance being taken upon that trace at the same distance from that vanishing point as its other points of distance.

This also is illustrated in the lower perspective plan, where in addition to the lines of measures drawn parallel to the traces already obtained, a line of measures *l r* is drawn at random at an angle of 15°. A new trace T L T is drawn through V^L parallel to it, and a new point of distance D^L_5 obtained upon it, where it intersects the *locus* of D^L.

The same thing is done again in the picture Fig. 15, where the divisions of the fence, on the right of the house, are taken by scale on an arbitrary line of measures just above. As this also is taken at 15°, the same point of distance, D^R_5, serves to transfer the dimensions to the line L, the top line of the fence.

123. Finally, just as of any two perspective lines having the same vanishing point, one may be regarded as the trace of a plane passing through the other (83), so a point of distance taken upon the first at the proper distance from that vanishing point may be used to lay off given dimensions upon the second by using a scale upon a line of real measures drawn parallel to the first, from the point where the second pierces the plane of measures.

This is illustrated in the plan of the little schoolhouse shown in the plate. The front line of the plan is regarded as the trace of a plane, and upon this trace the point of distance D^R_6, upon the *locus* of D^R, is easily determined. A line of measures is drawn parallel to it through the further corner of the plan, where the line K on the back of the building touches the plane of measures. The true width of the building being laid off on this line of measures by scale, and transferred to the perspective by means of a line drawn to the point of distance, we obtain the left-hand corner of the building, and the position of the rear window, as we ought to.

124. Here, as before (81), we must be careful not to suppose that this line of measures is drawn on the floor of the schoolhouse. It lies, in fact, in the vertical plane of measures, being an inclined line parallel to the plane of the picture. So also the point of distance is not on the ground, but is in the infinitely distant horizon which the front line of the building covers and apparently coincides with.

125. It is to be observed that the method of laying off real dimensions by points of distance, although analogous to that of laying off proportional measures by points of measures, differs from it in three particulars. In the first place it requires that the triangle shall be isosceles, or, which comes to the same thing, that its base shall be at right angles to the line dividing the angle. The direction of the base is the important thing. The second difference is this, that the lines of real measures all lie in the same vertical plane, while the lines of proportional measures may be taken anywhere; it being necessary only that they should be parallel to the picture. Every line of real measures may be used as a line of proportional measures, but not every line of proportional measures is also a line of real measures. The third difference is that in laying off proportional parts the length of the given line is fixed, and that of the auxiliary is indefinite; in laying off real dimensions these fix the length of the auxiliary, and it is upon the indefinite length of the given line that they are to be set off.

This difference is illustrated in Fig. 19, Plate IV.

The next paper will discuss the phenomena of parallel perspective, and the perspective of interiors.

Erratum. — In the first plate the vanishing points V_1 and V_2 should obviously be upon the trace T R N.

THE ILLUSTRATIONS.

STORE ON FRANKLIN STREET, BOSTON, MASS. MESSRS. CUMMINGS AND SEARS, ARCHITECTS.

THE material of which this store is built is Quincy granite.

HOUSE OF COM. C. H. BALDWIN, NEWPORT, R.I. MESSRS. POTTER AND ROBERTSON, ARCHITECTS.

SEASHORE RESIDENCE. MR. GEORGE E. HARNEY, ARCHITECT.

It is proposed to build this house at Bayshore, on Long Island.

INTERIOR VIEW OF THE NEW CATHOLIC CATHEDRAL AT QUEENSTOWN, IRELAND. MESSRS. PUGIN AND ASHLIN, ARCHITECTS.

We reproduce this design, which was published in the *Building News* not long ago, mainly because of the masterly way in which Mr. Gribble has handled one of the most difficult problems that a draughtsman is called on to solve, — the rendering of an interior perspective.

PERSPECTIVE STUDY. — PLATE V.

See the "Paper on Perspective" in this number.

MODERN PLUMBING. — I.

In the accounts of the various sanitary contrivances and systems which appear from time to time in the professional journals, valuable and interesting as they are, there is much that belongs decidedly to the experimental and theoretical, not to say impracticable, region of the science, and the enthusiast who should attempt to carry out even half of the devices so attractively described would soon find himself in trouble. For the ordinary practitioner, who is constantly called upon to judge of the merits of different apparatus, and is held responsible if he either ignores a real improvement or recommends a new appliance which turns out unsatisfactory, it is of great importance to keep clearly in mind the distinction between systems which have been extensively tried, and under varying circumstances, and those which, however simple in the description, have not yet been so thoroughly tested that an architect can conscientiously adopt them at his client's expense without at least warning him of their experimental character.

With the professional adviser, who keeps himself informed of the progress of sanitary matters, it is true, the line between the certain and the experimental will be constantly advancing; but it is not less a real distinction, and there may be many persons to whom a few words about the established and approved modern

sanitary appliances, with their merits and defects, as well as the proper modes of putting them together, and the means of judging of the work after it is done, will be of as much service as the accounts of new inventions; and these will find their interest in the new contrivances much increased after having acquired a thorough knowledge of the old.

PIPES.

To begin with the raw materials of plumbing-work, following this afterwards with an account of the different apparatus, and the modes of putting them together, the most important portion of the plumber's stock in trade consists of pipes.

Of these we have now in common use the plain lead, tin-lined lead, and block-tin, all made by drawing the metal over a mandril; the seamless brass pipes, drawn in a similar manner; and pipes of wrought-iron, with welded seams, plain, tin-lined, enamelled, rubber-coated, and galvanized. All these are used for supply pipes, and each has its merits and defects somewhat as follows:—

The lead pipe is the most generally used, and is convenient to work with, moderately cheap, and has the merit of yielding somewhat, so that it may freeze and thaw without bursting, and when a rupture does occur it is usually only a small hole.

The grand defect of lead for pipes is its solubility in water. Well-water generally contains a little dissolved carbonic acid, and sometimes sulphate of lime, either of which will soon coat the inside of the pipes with an insoluble crust of carbonate or sulphate of lead, after which the metal no longer affects the water in ordinary cases; but river or pond water dissolves the lead slowly, and rain-water, which often contains a little nitric acid, quite rapidly, and the solution so formed is poisonous. In practice, the soft water supplied in cities is seldom affected to a serious extent unless it has been allowed to stand a long time in the pipes; but rain-water is often so affected, and it is safest, where rain-water is used, to avoid the use of lead.

In order to prevent the contact of the water with the poisonous metal, pipes are made by fixing a lining of pure tin inside the lead for making the pipes, and drawing them out together, thus coating the inside with about one-fiftieth of an inch of tin, which is unaffected by water.

This tin-lined pipe is admirable in itself, and it is sometimes claimed that although it costs about sixty per cent more per pound than the common lead pipe, the tin lining strengthens it so much that a pipe of about half the weight can be used, making the cost about the same; but in practice the tin-lined pipe is usually put in of the same weight as lead pipe in a similar situation. Nothing, however, is perfect; and it is found that in soldering the joints of the tin-lined pipe the heat of the solder sometimes melts the coating of tin, which is very fusible, thus exposing the lead, and the galvanic action between the two metals causes the lead to dissolve in the water, occasionally to a serious extent.

The block-tin pipe is very costly, and is used only for the portions of pipe immersed in the water of cisterns or tanks, or for conveying ice-water or beer.

Plain iron pipes are little used for house-plumbing, for the obvious reason that they would soon fill with rust. They are protected by boiling in tar, which makes a cheap pipe, but retains a tarry flavor for a long time; or by a coating of black enamel; or by coating them inside and out with vulcanized India-rubber; or by galvanizing, that is, dipping them in melted zinc.

The enamelled pipes are made in several places, the rubber-coated only by Morris, Tasker, & Co. They are equally durable and good for their purpose, though the appearance of the red rubber-coating is, if any thing, rather pleasanter than the enamel.

The galvanized pipes are strong and durable for public buildings and other situations where roughly used, but their appearance is not attractive.

The cost of the enamelled, rubber-coated, and galvanized pipe is about the same; and each variety has couplings, branches, etc., which should always be of malleable iron for pipes of sizes used in plumbing, coated to correspond with the pipe. These are screwed together with red or white lead, precisely like gas or steam pipes; and all the varieties of pantry, bib, and basin cocks can be obtained with screws to fit them, so that no solder is used in jointing them. These pipes are so cheap, and the putting together so easy, that their use is economical; the average saving in house-plumbing by employing them instead of lead being eight or ten per cent.

There is another more expensive iron pipe, made in Philadelphia, and lined with a tin pipe, which is inserted and forced so strongly against the iron as to adhere quite perfectly to it. The connections are made by cutting away the tin from the joint and inserting a brass ferrule, tinned, and screwing up tight; the sharp edges of the ferrule force their way so firmly into the tin lining as to make a water-tight joint.

All the forms of protected iron pipe are liable in time, from careless workmanship, or the strain of contraction and expansion, or natural wear, to lose the protection in certain places; and when the water has once reached the iron, the pipe soon fills partially or entirely with rust. There may also be imperfections in the fittings, and if these or the joints should leak, the defect is not so easily stopped as in a lead pipe, and the freezing of a pipe opens a long seam, which will cause a flood when the water flows again.

With either iron or lead pipes for the cold water, it is well to have brass for the hot water pipes. The alternations of heat and cold strain the joints of the iron pipes so that a small opening is likely soon to be made in the enamel or other coating, exposing the pipe to rust. With lead, the expansion of a portion of pipe running horizontally, say across the kitchen ceiling, bends it slightly downward, unless very carefully supported; and when it cools, the contraction, instead of drawing the pipe back to the horizontal, stretches the metal a little. The next flow of hot water extends the pipe again, and it bends still further down, and so on until a "bag" is formed, which cannot be emptied when the water is drawn off from the house. The stiffness of the brass pipe prevents any such action, but the strain on the joints is so severe that they will sometimes leak. However, the advantage in using them is considerable, although they do not usually make so neat a job as the lead pipes.

Lead pipes are sold by weight, a $\frac{1}{2}$-inch pipe weighing two pounds, three pounds, or more or less, per foot, according to the thickness of the metal. In general, for supply-pipes, the thickness of the metal should not be less than $\frac{1}{10}$ of an inch, which will give for a $\frac{1}{2}$-inch pipe a weight of about three pounds per foot, and for a $\frac{1}{2}$-inch pipe about two pounds. With a heavy pressure the thickness must be greater, especially in the larger pipes.

The metal of iron and brass pipes is about $\frac{1}{16}$ or $\frac{1}{8}$ of an inch thick. They are sold either by the foot or by the pound, brass pipes more commonly by weight, and iron by length. In ordering pipes it should be remembered that brass pipes are classed according to their outside diameter, iron and lead by the inside diameter, so that the calibre of a $\frac{1}{2}$-inch brass pipe is less than that of a $\frac{1}{2}$-inch iron or lead pipe.

For waste-pipes, lead about $\frac{1}{10}$ inch in thickness of metal is commonly used, up to two inches in diameter. For two inches and larger, cast-iron is generally preferred in this country, on account of its stiffness, which keeps it perfect where a large lead pipe will lose its form and tear away from its connections by its own weight. There is a great difference in cast-iron pipes, some having the metal thicker on one side than the other, with other defects of imperfect casting. The only safety is to procure them of known and trustworthy makers or dealers. The thickness of the iron in two, three, and four inch pipes should not be less than $\frac{1}{8}$ of an inch. Heavier pipes are advised by many engineers, but not commonly used.

The two-inch pipes are used for bath and sink wastes, and four or four-and-a-half-inch for soil-pipes. Three-inch are seldom used in houses. It is a great mistake to use waste-pipes too large for their purpose. If two inches is sufficient diameter to give a sink waste which will not be obstructed, four or five sink wastes may join the same two-inch pipe at different points of its course, and the pipe will carry off the discharge of the whole, even if they should all run full at once. Where the drain within the house walls is of iron, a six-inch pipe is generally used, and is perhaps safest where it receives two or three soil-pipes and a rain-water pipe, which may all be running full at once, although a smaller pipe would keep itself clean better. Two waste-pipes should never join at right angles, in either a vertical or horizontal plane. If they approach at such an angle, the junction must be made with a bend, and a Y branch, the small end of the Y pointing down the current. This costs a dollar or so more than the right-angled junction, but is necessary to prevent obstruction.

T. M. Clark.

CORRESPONDENCE.

IMPROVEMENTS IN FIRE-PROTECTION.—AUTOMATIC HATCHWAY-CLOSERS.—FIRE AND SMOKE ESCAPES FOR THEATRES.

Chicago.

As in 1872, with the experience of a great disaster before us, the thoughts of many were turned towards providing against the contingency of its recurrence, so now, with the news coming in from every quarter, of death-dealing and property-destroying conflagrations, the subject is being agitated in Chicago and the West with renewed vigor. The first awakening resulted only in the erection of buildings with heavy walls, where before they had been of the flimsiest description. It is safe to say that the average thickness of the walls of Chicago business-buildings is greater than can be found among a similar grade of buildings elsewhere. Several isolated fires in the late burned district have demonstrated this. A year ago a six-story double warehouse, with three sides exposed, was burned, and only a few bricks fell from the top of a rear wall. The interior was rebuilt with the original walls. The fire of 1874, sweeping half a mile through frame structures, was stopped by the heavy party-walls of the rebuilt district.

But beyond the erection of thick walls but few improvements calculated to guard against fire have been adopted until recently. Several buildings with iron floor-beams, which were supposed to be fire-proof, were erected after the great fire; but none of them show any advances upon heretofore well-known methods which are now known to be any thing but fire-proof, for the particular reason that the necessity for protecting the constructive iron-work has not

been recognized. Three years ago the first fire-proof iron columns ever used in this city were introduced by Messrs. Treat & Foltz, in the elegant Chicago Club House. We are now to see an attempt to build a really fire-proof store, that of the Singer Manufacturing Co., which has already been described in this correspondence; and it yet remains to be seen if the promises held forth are fulfilled.

In one respect Chicago has not been behind other cities in adopting protection against what is now considered by the press of the whole country as the greatest evil existing in our modern system of building, — the open elevator-shaft. Some ephemeral attempts in this direction were made in the wholesale store of J. V. Farwell & Co., on Monroe Street, in 1872; but the experiment failed, as the machinery was not adequate to cope with the speed of the elevator. During the past year a number of elevators in stores have been protected by automatic hatch-closers. In the large new building of Steele & Price on Randolph Street, designed by Mr. Carroll, architect: a hatch-closer of novel construction is now in successful operation. The elevator is a little more than six feet square, is operated by steam, and travels about seventy-five feet per minute. As used, it averages two hundred and fifty trips per day, or five hundred openings for every floor. The doors, or rather valves, — for they are intended solely to intercept fire and smoke, — are made of corrugated iron riveted to solid frames of angle iron, with square iron pivot bars or shafts which work on journals. There are two principal doors to each opening, and, as it is a corner-post elevator, two subsidiary doors or flaps six inches wide which fill the spaces caused by the thickness of the corner guide posts. In connection with these hatch-closers an automatic gate is worked on each floor. The elevator-holes are railed off on the sides, and it is impossible to encroach on them except when the elevator is at one of the floors.

In the matter of protecting theatres from the danger arising from fires, Mr. Cleaveland, the superintendent of buildings, has made great efforts to have the proper reforms introduced, but has generally been thwarted in his attempts, principally from want of authority. Hooly's Theatre is the only one in which much has been done. New stairways, additional exits, and standpipes always supplied with water, have been introduced. But the principal improvement has been the introduction of Karls's apparatus to facilitate the exit of the audience without danger. The theory of Mr. Karls is that they should get rid of the fire and the audience at the same time, not by extinguishing the fire, but by letting it escape from the building without hurting any one. Heretofore the placing of a large ventilator over a central chandelier has been the cause of drawing fire and smoke from the stage directly over the heads of the audience, as was the case in the Brooklyn Theatre. Assuming, therefore, that the danger to the audience proceeds mainly from a fire on the stage, he provides an exit for it above the stage by a very simple contrivance which simultaneously closes the outlet over the audience. He assumes that the proscenium wall is fire-proof, and that all openings in it are stopped by fire-resisting doors provided with strong springs to keep them closed. In the Hooly Theatre there was no fire-wall, so he has made the partition as nearly fire-proof as possible by covering it with sheet-iron. The under side of the roof and trusses were then covered in the same manner, so as to allow them to stand fire for some time at least. Directly over the centre of the stage he places a boiler-iron flue eight feet in diameter and thirty feet high. In this flue is a valve made of a wooden frame covered with canvas; a balance weight keeps it closed. The next thing to do is to provide for opening it from as many points as possible. A wire cable connection is carried down to each side of the stage. On one side it is directly opposite the prompter. Other cables are carried to the door-keepers on the first floor and first balcony, and another cable is carried to the door from the second balcony and secured to it. As this door is only opened for the exit of the audience, the valve must be opened with the door, which is sure to be the case every night — and very likely to be the case if there is a panic. At each place where the valve cords can be used, is a large sign explaining their use, painted on iron, and securely fastened to the wall. By pulling a large ring at any one of them, the valve is opened, and simultaneously a valve in the dome ventilator is closed. The opening of the doors creates a current of air toward the stage, and the flames and smoke go up through the scenery and out through the ventilator. If the valve is not worked, being of canvas it will be destroyed by the fire. Not long since, an exhibition of this apparatus was given; and though repeated experiments were made by Fire-Marshal Benner and others, it never failed to discharge all the smoke that could be raised by artificial means. It is not difficult to see that in a new building this arrangement could be made more effective. In Hooly's Theatre it gives the additional advantage of providing ventilation for the stage when desired, rapidly freeing it from the smoke often made in theatrical representations. In the presentation of "Der Freischütz" recently, the manager was enabled to use an extraordinary amount of fire-works without fear of discomfort to any one, by keeping the flue open at the right time.

In 1850 the Catholic bishops in the United States held $9,000,000 worth of property. They now hold $110,000,000.

SOME DISPUTED POINTS IN HOUSE-DRAINAGE.

NEW YORK.

TO THE EDITOR OF THE AMERICAN ARCHITECT AND BUILDING NEWS.

The article in your issue of Feb. 23, entitled "The Sanitary Pamphlet of the New York Board of Health," raises some questions of sufficient public interest to justify their further consideration. The pamphlet you criticise certainly merits disapprobation, as it is evidently the work of gentlemen imperfectly acquainted with the mechanics of hygiene; and is doubly calculated to mislead, because published with the seal of official authority.

But while the pamphlet in question calls for sharp criticism, your own remarks suggest several topics which might be discussed with advantage. Alluding to the arrangement of pipes, etc., shown in the illustration on p. 65, you say: —

"1. In place of the underground drain, we should recommend an iron soil-pipe, starting just under the ground floor near the rear wall, and running out just above the cellar-bottom through the front wall. The running trap in this drain we should place outside of the foundation wall in a covered well. We should make this trap a very deep one."

In my judgment, the placing of a trap in the soil-pipe is one of the most objectionable recommendations of the Health Board's pamphlet. The change you suggest would not, I think, help matters. If it be true, as you say in a paragraph subsequent to the one above quoted, that "no water-trap will prevent the passage of gases," of what use is such a trap in a pipe vented above the roof? To hold the foul air of sewers in suppression by means of a water-seal in a trap is known to be an impossibility; and in view of this well-understood fact, I cannot see any benefit in putting a trap where it will only reduce the scouring power of the descending water by the increased friction due to a double curve. On the other hand, I can see many and serious objections to a trap in such a place: and the deeper the seal, the greater the objections. There is no circulation of air in a trapped pipe; and a column of air held motionless for even a few moments in contact with the foul, slimy lining of a soil-pipe, becomes charged with impurities. Air from pipes is practically as bad as air from sewers, and cannot be breathed with any more safety. Now suppose that in such a pipe a fixture on one of the upper floors is discharged. The rush of water down the vertical line of soil-pipe sets in motion the whole column of air in the pipe. In other words, the down-flow of water, especially when discharged in considerable volume as from a closet, causes a down-rush of air with it. In an untrapped pipe this air would be discharged into the sewer, and fresh air would come in at the top of the pipe to take its place. When, however, the soil-pipe is trapped at any point, the air within the pipe, set in motion by a discharge of water, cushions on the seal, and, being elastic, is slightly compressed. Then comes the trouble. The depth of seal being greater and the volume of water larger in a trap of four inches or more diameter than in the traps of one and a half, two, or three inch branch-wastes, the latter yield first; and before the confined air has forced its way through the seal in the soil-pipe trap, we have a puff of foul air from the pipe, discharged from every fixture below the point at which the flush of waste water started. A trickling stream would not accomplish this result in a four-inch pipe; but a wad of soil and paper from a water-closet trap, falling like a piston through the soil-pipe, would do it every time. As there is abundant evidence in support of the assertion that the air of waste-pipes is foul and unwholesome, I cannot consider it good practice to put a trap where the resistance offered by its seal will cause this air to blow out through fixtures into living and sleeping rooms.

I am also compelled to take issue with the following suggestion: —

"4. The main soil-pipe (rising through the house) should not be turned over at the top, but should be capped with an Emerson ventilator."

The object of turning the pipe over is to keep its mouth free from ice and snow which might otherwise close it in stormy winter weather. I have never seen any form of cowl or top which was adapted for use at the end of a soil-pipe vent. All we want is an adequate opening through which air may pass in or out without hinderance. Its flow in either direction cannot be assisted with advantage.

I believe the time is not far distant when sanitary engineers will reach the conclusion that any attempt to hold the gases of the sewers in suppression is a dangerous mistake. If we will only ventilate our sewers and soil-pipes sufficiently, the evil of sewer-gas poisoning will cease to exist. If every manhole cover in our streets were replaced with a strong open grating, and every house draining into a sewer were required to carry its soil-pipe above the roof, unobstructed by traps at any point, we should find that there was no sewer-gas and no pressures of bad air in pipes to deal with or provide for.

Respectfully,

J. C. BAYLES.

NOTES AND CLIPPINGS.

The Competitions in Interior Decoration.—It has not been possible to return the drawings submitted for the first competition by "Nemo," "*Omnia Expecto Sperare*," "Onward," "Prairie Queen," "A Pish," and another, because we are unable to identify their authors. To prevent similar delays, and to simplify the work of identification, competitors are requested to enclose with their real names the device attached to the drawing. They are also requested to send their names and addresses upon half-sheets of note-paper of the ordinary size, that they may be easily filed away. We also suggest that competitors assume new devices for each competition.

The Chicago Court House.—The county attorney, Mr. Wallace, has come to the conclusion that there is nothing in the records of the County Board that indicates the existence of any contract on the part of the city to build a dome; therefore it seems that the money already spent by the county in building the "foundations" for the dome—some $75,000—has been absolutely wasted.

Cincinnati's Public Buildings.—Mr. Henry Probasco, who some years ago gave the city of Cincinnati a bronze fountain, has offered to give the city his art collection, which is said to be valued at $200,000, provided that a suitable fire-proof building shall be built to receive it.

Panic.—At a meeting of Cuban sympathizers held at Masonic Hall in New York on March 17, the floor settled suddenly some three or four inches near the doorway. The attention of the audience was drawn to the accident by the noise of cracking wood; and a panic immediately taking place, numbers were knocked down and trampled on.

Rapid Bridge-Building.—The new wooden bridge across the Raritan River at New Brunswick, N.J., was completed by the Pennsylvania Railroad Company in a little over four days. The new structure is 900 feet long, cost $20,000, and was put up by 500 men.

Elevator Accident.—The Paris *Figaro* gives the following account of the elevator accident at the Grand Hôtel, that we mentioned a short time ago: "The elevator was worked by water. A reservoir on the top of the hotel supplied a powerful stream of water through a large tube, which acted on the end of a long piston and, with the aid of two heavy counter-weights, forced it to the roof. In descending the water was gradually let out, so as to allow the piston to go down gradually. At the top of the piston was a large casting, surmounted by a broad platform on which the car was placed. At about eight o'clock in the morning Baron and Baroness de Shack were about to leave the hotel. The Baron went down from the second story by the staircase, but the Baroness, being fifty-six years of age and somewhat infirm, naturally preferred the easier and more agreeable method of descending by the elevator. So she rang for the elevator to be brought up to the second story. She took her place in the car, or cage, with a superintendent of the building and the man who worked the apparatus. The conductor touched the button, but instead of descending, the car began to mount with alarming rapidity. The casting which united the piston to the platform on which the car rested had broken. While the force of water was beneath the piston, and the car was ascending, this was not felt, as the piston ran up and lifted the load as usual; but immediately the escape-valve was opened at the foot of the supply-pipe, the piston darted downward by itself with fearful speed to the bottom, while counter-weights, now much heavier than the car and its load, began to run down, and pulled the cage up at a dizzy rate. Arriving at the top floor, the car was violently rammed against the top beam. The shock was so great that it broke the chains which held the counter-weights, and the car went flying down to the basement. The weights fell with a report almost equal to a cannon-shot, attracting nearly every person in the building. The three occupants of the cage were dead, all bleeding from the mouth and ears, showing cerebral congestion. A doctor was called, but his aid was unnecessary. At the inquest it was ascertained that a 'blister' in the casting was the cause of the disaster."

The Palais de Justice at Brussels.—It is comforting to know that American building committees are not the only ones who let the cost of the buildings they have in charge exceed the appropriations. It is said that the new Palais de Justice at Brussels will cost some $7,000,000, although the original appropriation was only $1,600,000.

One of the Highest Mountains.—According to recent geographical surveys it seems that the Aconcagua peak is the loftiest of the Andes range, and the highest in America. It is 100 miles east of Valparaiso, and nearly in latitude 32° 30′ south. Its actual height is not accurately known, but the measurements made by M. Pissis and other noted scientists make it reasonably certain that the elevation is between 22,400 and 23,000 feet above the waters of the sea. The French explorer made it 22,422, or four miles and 1,302 feet over, which would be 568 feet higher than the snowy summit of Chimborazo, as Humboldt measured the latter, when in 1802 the great German made his famous ascent of that mountain with Bonpland to a height of 19,286 feet. Aconcagua, seen from the Chilian seaport of Valparaiso, is shown only as a peak, towering above the other heights of the Andes at a distance of 100 miles or more inland, toward the sunrise. Aconcagua has been called an extinct volcano, but the best examinations yet made of its summit do not appear to bear out that idea. The recent observations make the height of the Chilian mountain 23,300 feet, and "probably" over that figure. The elevation of Mexico's highest mountain—Popocatepetl, or "smoking mountain"—is nearly 5,000 feet less than that of the Chilian peak, and Mount Shasta and Mount Hood fall short to about the same figure. Pike's Peak is about 9,000 feet lower than Aconcagua.

How to trace a Leak.—A correspondent of the *Plumber* says that when called on to detect a leak in the soil-pipe of a house, he goes at once to the roof, if the soil-pipe be carried above the roof; if not, he goes to the uppermost water-closet; and pours into one or the other something like an ounce of oil of peppermint, and follows it up with enough water to insure its being carried the full length of the soil-pipe. He then traces the soil-pipe from the bottom, throughout its course; knowing that if there is any crevice through which sewer-gas can enter, the pungent odor of the volatile essential oil will be readily perceptible even in the presence of odors of a baser kind. This practice in the hands of an ignorant or scheming plumber may be made the ground for an order to thoroughly overhaul and change the pipes throughout a whole house; for the plumber has but to slyly open for an instant the bottle containing the powerful essence, for the proprietor to think he has nasal evidence that his pipes are sleak, and his family in imminent danger.

A New Cement.—Herr Pollock of Saxony has invented a cement, composed of pure oxide of lead and concentrated glycerine, which is adapted for cementing both iron and wood-work. The mixture is insoluble in acids, hardens quickly, and is not influenced by heat. When this compound is used, and after it has become properly hardened, it is more easy to break the solid stone than to separate the parts thus cemented.

Unsuspected Explosives.—We have mentioned that the dust of flour, starch, and also finely triturated cork have been known to be the cause of explosions more or less violent; and we now learn from the *Revue Industrielle* that charcoal must be added to the list of these ordinarily innocent substances. A workman carrying a lighted candle in his hand opened a cylinder wherein a copper chain was being polished by friction with pulverized charcoal, and the charcoal dust igniting caused an explosion of considerable violence. The *Revue* suggests that explosions in coal-mines often may be due not to fire-damp, but to the fine coal-dust suspended in the air, and supports the suggestion by the fact that explosions are more frequent in dry mines than in damp ones.

Self-Luminous Wall-Paper.—Referring to the suggestion made by the *Papier Zeitung*, that wall-paper could be coated with oxalate of copper, which appears lighter as the room grows darker, and *vice versa*, the *Manufacturer and Builder* suggests that a room might be made temporarily self-luminous by similar means. There are several salts which absorb light if exposed to it, and give it out afterwards. Among these are the sulphides of barium and strontium, and certain coal-tar extracts of the anthracene series. Probably the best agent to employ would be the electric light, which could be shut off when the wall-paper had acquired its phosphorescent power. It would practically be of use only in the initiation performances of a secret society.

Fire-Escape.—An Iowa deaf-mute has invented a naval fire-escape. It is a cap or turban to be placed on the head, and fastened securely under the chin. It contains enough material to form, when inflated, a small balloon. It is so arranged that, when placed on the head in its collapsed condition, the air can enter it from underneath and expand it. In case of danger, it is adjusted firmly on the head, and the wearer may then jump from the window of a burning building; the air instantly rushes into the turban, swells it into a balloon, and, buoyed by it, the wearer comes down so gently as to strike the ground with little force. The inventor asserts that with it one can jump safely from a fourth-story window.

Artificial Black Walnut.—A Belgian journal says a new process has been applied to the manufacture of artificial black walnut, by which ordinary wood has imparted to it the appearance of the most beautiful specimens of walnut, adapted to the very finest cabinet-work. The wood, first thoroughly dried and warmed, is coated once or twice with a liquid composed of one part by weight of extract of walnut peel, dissolved in six parts of soft water by heating it to boiling, and stirring. The wood thus treated is, when half dry, brushed with a solution of one part by weight of bichromate of potash in five parts of boiling water, and, after drying thoroughly, is rubbed and polished. The color is thus said to be fixed in the wood to a depth of one or two lines; and in the case of red beech or alder, for instance, the walnut appearance is most perfect.

Bill Stumps Redivivus.—An amusing story is told of a German amateur antiquary, which recalls Mr. Pickwick and the headstone of Bill Stumps. While in search of curiosities that might have been neglected by his predecessors, this antiquary stumbled upon a farm-building which had built into one of its walls a stone with the date 1091 very rudely cut upon its face. The farmer readily sold the stone, and agreed to deliver it at the hotel. So agreed, so done: but when the stone arrived, it had become less venerable by 720 years; for the date was now clearly 1891. The farmer accounted for this rejuvenation by saying that his grandfather, who built the barn, finding that the stone did not bond well in its proper position, had set it in the wall upside down.

Trade Mottoes.—Some of the mottoes of the London city companies are very curious; the Blacksmiths', for instance, have for their motto, "By hammer and hand all arts do stand;" the Distillers', "Drop as rain, distil as dew;" the Founders', "God the only Founder;" the Framework Knitters', "Speed, strength, and truth united;" the Innholders', "Come, ye blessed! when I was harborless, ye lodged me;" the Joiners', "Join loyalty and liberty;" the Saddlers', "Hold fast, sit sure;" the Watermen's, "By command of our superiors;" Weavers', "Weave truth with trust;" and the Needlemakers', "They sewed leaves together, and made themselves aprons."

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THE long and embarrassed competition over the new Indiana State Capitol has been decided, and the design submitted by Mr. Edwin May of Indianapolis has been accepted. It is rather surprising, and a curious comment on the present lack of employment for architects, that sixty were found who were willing to subscribe to the hard conditions of the competition, and bind themselves in the sum of a hundred thousand dollars to produce a perfect building for a stipulated sum under the authority of irresponsible commissioners. We are informed by a correspondent that most of the designs submitted were of little merit; and it is noteworthy as an indication of preference in style that only two out of the sixty were Gothic. We have no more definite information concerning the successful design than the opinion of our correspondent that it is mediocre, and the statement that it is classic with French treatment; or more definitely, as the Louisville *Courier-Journal* has it: "The general plan of the building is of the classic Corinthian order, with a central dome." It is a building of 482 feet by 292 in extreme measurement, with projecting fronts of 184 feet on the long sides; and is estimated by its architect to cost $1,722,000,—a good deal for the money, we should say, and an opportunity for the architect to easily sink his hundred thousand dollars in extra cost. The act of legislature for building the Capitol, however, allowed two millions for its cost. The Commissioners have assigned the architect the full commission allowed by the bill,—three per cent.

ALL accounts seem to agree that the wise action of the legislature in requiring the commissioners to consult three experts — an architect, an engineer, and a builder — has been nullified by the commission. The advice of the experts has been contemptuously disregarded, it would appear, and they have been employed simply to revise the estimates submitted by the competitors. The saying of one of the commissioners which is reported in the *Courier-Journal*, that the experts "had nothing to do about it anyhow, and they had better keep their blasted mouths shut," will probably convince the people of Indiana that their work is in the right hands, and will teach the considerate architect that the commissioners will stand no nonsense. The shutting of the mouths of the experts has apparently been undertaken for them, for we are told that the commission has suppressed all the criticisms on the designs before them contained in their report, presenting only their estimates. It remains to be seen how the legislature will receive this free and easy setting aside of their obvious intention; but it may be that they have no remedy. It appears to the reader of the bill (see *American Architect* for March 31, 1877), that they have guarded the State pretty carefully against everybody but the commissioners.

AN interesting paper just printed by the Trustees of the Johns Hopkins Hospital, as one of their series of reports on construction and organization, is Dr. Billings's paper on the ventilation and heating of the hospital. It is chiefly a compact discussion of the requirements of hospital ventilation, and of the advantages of the different systems in use; including some tables of observations taken during certain weeks of the past season in the Barnes Hospital in Washington, and the Boston City Hospital, of the working of their appliances for heating and ventilation. These are, says Dr. Billings, the best observations of the kind ever made in this country: and they are interesting because they show what is accomplished in two carefully ventilated hospitals, though they are necessarily inadequate to show what may or may not be done. It appears that in heating one ward of the Boston hospital about 220,000 cubic feet of air per hour were raised thirty-two degrees in temperature, on an average, with a consumption of 25 pounds of coal, and in the Barnes Hospital 800,000 feet with 70 pounds, the volume of air treated being nearly four to one, and the consumption nearly three to one. The average supply of air per bed was in the one about two feet per second, and in the other about one and a half,—in both cases a very liberal allowance; but the percentage of impurity shown by analysis was about the same in both cases, indicating apparently that the distribution was more successful or more economical in the Washington hospital. It is noticeable also that the variations in temperature and humidity in the ward are much greater in the Boston hospital,—a not unnatural result of having a more extreme climate to deal with,—and especially that the average humidity in the Boston ward was extremely low in comparison, being very irregular, and descending at times as low as 17 or 18 degrees, while at Washington it was never below 43 and commonly not below 60, the extreme variation being in the first case from 17 to 40 degrees, and in the second from 43 to 82. The average thus shown in the Boston hospital is certainly below what is usually considered comfortable or desirable; but the observations were confined to a very short time at the driest season of the year. The humidity, it is true, is a point to which Dr. Billings does not seem to attach much importance; but European authorities are inclined to take a different view of it, and we think that common observation, whatever it may be worth, seems to support them.

THE disposition of the Johns Hopkins Hospital requires more than one apparatus for heating, and for ventilation (see plans in *American Architect*, Dec. 23, 1876); and Dr. Billings wisely recommends that, considering the relative merits of different systems to be as yet undetermined, more than one method of ventilation shall be tried, and heating apparatus both for hot water and steam be put in. One of the purposes of the hospital, he says, is educational, and it "should be a sort of laboratory of heating and ventilation." In this view it will give an opportunity, such as has not been found before, for testing different methods simultaneously, with careful observation, on a large scale, and under identical conditions. Such an opportunity can hardly be overvalued, unusual as it is, and can be furnished without detriment to the hospital, since it may be assumed that in the present state of our knowledge all the contrivances used will be found fairly efficient, while no system has thus far established a conclusive superiority. Dr. Billings inclines to think heating by hot water better on the whole than steam heating, and we are disposed to agree with him so far as absolute convenience is concerned, though we are not sure that it is better for rigid economy, inasmuch as the pressure in it, and therefore the weight of the apparatus, increases rapidly with the height of the building heated, and because we suspect that latent heat can be carried with greater economy than free heat to the remote points where it is to be applied. One appliance for ventilation to which Dr. Billings ascribes great importance, wherein he is well sustained by Dr. Huntington of the Barnes Hospital, is the fan. It is a less expensive appliance than is

commonly supposed, — the fan and engine proposed for the Johns Hopkins Hospital are estimated at a thousand dollars, — and it costs little to run it where there is already a steam boiler. It is a much more manageable and efficient motive power than a draught-chimney. Some important details of its application are given in the report, and among them an example of its importance where there is need, as in case of operations, or other special emergencies in hospitals, to make a rapid change in the air of a room. Dr. Huntington quotes one instance where the proportion of carbonic acid in the air of a vitiated ward was changed in ten minutes by running the fan, as shown by careful experiment, from 11.23 volumes in ten thousand to 3.75.

Except drawings and photographs of architectural work for the French Exhibition have been received by the Committee of the Royal Institute of British Architects to occupy over two thousand square feet of surface, says the *Architect*. The committee has at its disposal only a little more than a thousand feet of wall and a small screen. It has been obliged therefore to reject a third of what was offered, enforcing as far as possible the rule to refuse all drawings of designs not carried out, and winnow the remainder as it best could. A question naturally suggests itself in such a case, whether drawings should not be given preference over photographs, at least on walls, partly because they exhibit two phases of the architect's art instead of one; partly because the actual objects exhibited are then works of art pure and simple and not manufactures; partly because photographs can at need be exhibited to those who will take the trouble to look at them without using up wall-space, and indeed are less fitted to be seen from a distance than drawings; and finally because the number of photographs is practically infinite, and the case becomes one mainly of "first come, first served." It is also a question whether drawings for unexecuted work, at least if made with *bona-fide* intention, are not as fair representations of the attainment and capability of a profession, and as instructive, as those of executed work, which are presumably made before the work is built. It looks as if the main advantage of the exclusion were in saving the embarrassment and labor of selection. These questions do not immediately concern Americans, since there is no indication that there will be any American exhibit of architectural work, but they may at any other time.

The report of the first year's field-work of the New York State Survey, which we have just received, seems to indicate that the work has been carried on with remarkable efficiency and economy, the cost having fallen a good deal below the estimate of $20,000 submitted by the Commissioners last year (see *American Architect*, March 3, 1877). The whole expenditure for the year has been a little less than $11,000, and a good deal of this has been for instruments and "plant," which are permanent, the actual cost of the surveying being about $9,000. With the slender force thus provided, signal stations have been established, and a chain of well-conditioned primary triangles located in a belt across the middle of the State from the Hudson to Lake Ontario. These start from the United States Coast Survey stations at Rafinesque and Helderberg near Albany (connected by a line which is the base of the State Survey) and lead to the United-States Lake Survey station at Victory near the lake. This gives the survey the vantage not only of a line fixed and carefully computed by the general government to serve as a base, but a point fixed with independent precision at the other end of the chain, by which to check the intervening work. Of this belt the triangulation has been finished in the eastern half, — the primary triangles determined with precision, the secondary and tertiary triangles filled in and observed, the important points of the topography noted, and many barometrical altitudes taken. The report of the Director, Mr. Jas. T. Gardner, which is submitted with that of the Commission, tells us that the area covered by the executed triangulation is about 1,700 square miles, within which were determined eight primary stations, eighteen secondary, and fifteen tertiary, and from these the positions of one hundred and seventy points were fixed, making one in every ten square miles. The primary triangles were repeatedly measured, to insure accuracy, and we are told that in no case did the errors of closure exceed three minutes. Seventy meridian lines were established to aid in the determination of local surveys.

The act of 1876, which authorized the survey, required that it should include the determination of the state and county lines, a thing which the loss of old landmarks has made imperatively necessary; and the party charged with this duty accordingly examined during the season 175 miles of county boundaries, and marked 51 points on them by monuments. But for the sake of economy, impelled probably by the slenderness of the allowance made them, the Director, and after him the Commission, have recommended that this determination of boundaries be hereafter left to the counties themselves, and that the State survey be confined, for the present at least, to mere triangulation, leaving the topography also to be filled in by local surveys. There is, however, a manifest advantage in having the boundaries between contiguous and therefore possibly conflicting counties determined by an authority independent of both; and probably the work could now be done both with more economy and more precision than if it were assigned to the counties to do at their leisure — to say nothing of the probability that this would mean putting it off till it became still more difficult and costly than it is now. We are inclined to think, then, that the State was judicious in directing that this should be part of the work of the present survey. As for the topography, that too is, no doubt, a part of the work that could be much better done now and by the State in the present survey. In fact, there is little chance of its being done with decent faithfulness, or in most parts of the State even of its being done at all, until the State does it, and this probably the Director and the Commissioners do not forget; but it may be thought best to let an informed public opinion grow to an appreciation of the work before an attempt is made to carry out literally the requirement of the act for "an accurate topographical survey." The need of a survey, at least, is sufficiently emphasized by a sketch map which is added to that which in the report shows the progress of the triangulation. This map records some errors in location of the latest map of one of the counties surveyed, where towns are from a quarter to three-quarters of a mile out of their places, and where there are errors in distance of half a mile in four miles and a half, and a mile and a half in fifteen.

A principal plank in the working-men's platform has always been the suppression of convict-labor, or at least its removal from competition with outside labor. There has been a good deal of canvassing in favor of it lately, and just now a memorial for it is going about among the working-men of Buffalo for signatures, of which it is said that five thousand are already secured. The memorial is reported to have the support both of workmen and employers; and a mass-meeting was to have been called for one day of this week to favor it. The question is not without its difficulties; but, so far as we can see, the only interests in it that need to be considered by legislators are those of the State and of the convicts themselves. We do not believe that if convict-labor were abolished to-morrow the working-men would find any change in their condition. A momentary disturbance of the balance in the towns where it was employed would be all the result, and would be quickly over. The hundreds of thousands of workmen in New York are too many to be perceptibly affected by the employment of the few hundreds of inferior men that are hired out from the prisons. A few places would become vacant in two or three towns; men would come in from without to restore the equilibrium, and things would be to them as they were before. The working-men's grievance is here a sentimental one of too unsubstantial a kind to waste legislation upon.

To the State it is unquestionably beneficial that the convicts should be employed. The financial aspect of the question is subordinate and hardly worth considering; but convicts are more easily controlled and less dangerous when they are kept at work. It is an advantage to society that when they are discharged they should be in as good a condition as

possible, and there is no doubt that labor is wholesome for them, and on the whole saves them from some deterioration. The good of the convicts themselves equally requires that they be kept at work. But no way has yet been devised of keeping them at work without in some way bringing their labor into competition with that of outside workmen. A writer to the Buffalo *News* proposes an act of the legislature which shall require them to be paid the same wages as ordinary men in their crafts, — an obviously impracticable suggestion, for no contractor would pay these wages for them, nor could they be made to earn them in any way. Another suggestion of the same writer is more reasonable, — that the convict's wages shall be turned over by the State for the support of his family, if he has one, and if not that they shall be accumulated as a fund for his use when he is discharged. Here again the pecuniary interest of the State is too secondary to be considered, and it may fairly be urged that if society for its own protection takes away from his family the supporter, such as he is, on whom they have a right to rely, it should still leave them the benefit of whatever he may earn. It is quite possible that to know he was helping support his family would often encourage a prisoner to work better, and this could not but have a good effect on him; or if he had no family it might be some spur to him on the difficult path to reform, to find when he came out that there were savings waiting for him.

A curious quarrel has arisen over the use of the New York Post Office. The building, like others of its class, is under control of the Secretary of the Treasury, except so far as it is assigned to the Post Office. A short time ago the Secretary directed the Collector of Internal Revenue for New York to give up the offices he has occupied on Cedar Street, for which the Government has paid a rent of $45,000, and assigned him rooms in the Post Office building now occupied by the United States Commissioner and the District Attorney, directing the Commissioner to transfer himself to the upper story. Mr. Davenport, the Commissioner, objected to the change, and flatly refused to move, intrenching himself behind a clause in the deed of sale by which the city conveyed the ground occupied by the Post Office to the United States. This clause provides that the building "shall be used and occupied exclusively as and for a Post Office and Court House for the United States of America, and for no other purpose whatever;" and that if it ever ceases to be used for these purposes, or is used for any other, the land shall revert to the city. Mr. Davenport therefore proclaims that the Government is debarred from introducing the collector into the building, and will invalidate its title if it does so, and that he will not seal the forfeiture by acquiescence in the Secretary's order. This controversy has made some excitement, by raising the question whether the Government has not already forfeited its title in assigning rooms in the building to the Steamboat Inspectors, the Commissioner for the Paris Exhibition, and the Secret Service Department; and a resolution has been adopted by the New York Board of Aldermen, inquiring of the corporation counsel whether such a use of the building does not work a forfeiture. The provision in the deed seems to have been ill-considered on the part of the Government, and was probably unknown to Mr. Sherman, as it was forgotten by pretty much everybody else. It is perhaps desirable to have the question determined now, once for all; but the position of the Commissioner seems to be a weak one: for it is difficult to see what effect his acquiescence in the Secretary's order, after due protest, could have, or what right he has to resist it in any case, if the control of the building belongs to the Treasury Department.

The New York Society of Decorative Art has taken up the wise plan of mediating between professional designers and the amateurs and others whose work it receives. It proposes to find means to carry out the drawings of architects and designers for such work as it supplies, — painted tiles, plaques and panels, or hangings and embroideries. It also offers to receive designs, paying for them when used. From any one who will furnish suitable ones. This strikes us as excellent in more ways than one. There are a great many amateurs and *quasi*-amateurs who are able to execute decorative work acceptably, but whose want of discipline in design makes their performances unsatisfactory when they are left to themselves, to whom it would be profitable to work under direction. There are many architects and others engaged in carrying on work for which such artists could furnish desirable details if they could be set at work on them, and there are many more or less clever draughtsmen and designers to whom an opportunity of improving their skill by practice, and of earning something in dull times, by designing in a small way, should be very acceptable. There are, in short, plenty of people who would be glad to design, and plenty who would be ready to execute: any means that will bring the capable ones among these into working connection is a thing to be welcomed.

SIR EDMUND BECKET ON THE FRAILTIES OF ARCHITECTS.[1]

The recent instances in several cities, of trouble between architects and their clients, have called to our mind Sir Edmund Becket and his remarkable book, which although published more than a year ago, and reviewed with more or less meekness by all the professional journals of London, has not been noticed in these pages.

Sir Edmund Becket has for a good while been a thorn in the side of the English architects, with whom, nevertheless, he seems to be personally on the best of terms. We call his book remarkable because it furnishes the first instance we remember in which a respectable profession has been deliberately overhauled in print for its methods of dealing with its patrons. Cases enough of individual complaint we have all of us known, alas! often with too much reason. But that a man of somewhat eminent and conspicuous position in the world of London, a Queen's Counsel, an LL.D., and a man familiar by long experience with the ways of architects, who has been in the habit of attending by invitation the meetings of the R. I. B. A., and of taking a prominent part in their discussions, should come forth with a book declaring in substance that their ways are unreasonable, their charges extortionate, their airs intolerable, is certainly, to our mind, nothing less than extraordinary. We do not mean to say that this is the purpose of the book, which is indeed an innocent-looking volume enough, intended to furnish non-professional persons with certain useful information as to the best way of going to work to build themselves houses, together with many items of knowledge concerning the practical details of house-building and church-building, also a table showing the size of every principal church in Europe, and a dissertation on the Pyramids. It is only the first fifty pages or so which deal with the frailties of the architectural profession, and it is only these which we propose noticing here.

The author devotes a few vigorous pages at the outset to the condemnation of architectural competitions as a means of securing the best service: and we have never seen stronger testimony against the usefulness of that favorite institution. Here is a matter, he says, "in which all the *a priori* reasons point one way, and all experience another." He confesses the plausibility of the reasons commonly brought forward in favor of competitions, and states them fairly, but declares that experience tells another tale; that the anonymous element in the designs is a delusion, — every prominent architect having a manner both of design and rendering, as well known as himself, and that if that were not enough, every competitor who has a friend among the judges takes good care that his friend knows which is his design; that the best architects will refuse all competitions but the great ones, and are justly getting shy even of those; that the excitement of a great competition throws even the best architects off their balance, which is the only way he can account for the badness of all the Law Courts designs and of those for the Albert Memorial; that the character of competition drawings is such as to preclude committees from getting a fair idea of what the building would be if built, — all sorts of "clever fallacies," as he mildly calls them, being employed by architects to make the building look imposing; all recesses being exaggerated by false shadows, the foregrounds being filled with fine ladies and gentlemen on foot and horseback, looking very small compared with the building, steeples always being surrounded by flights of crows, evidently designed to contribute to the grandeur of the building, because rooks notoriously despise all but very high trees. Finally he observes that the history of all the recent great competitions shows that the man who gets the first prize seldom carries out the work. "Although a pair of comparatively unknown architects got the Foreign Office prize in 1857 from a set of inexperienced judges, it soon came to be understood that the prize was all they were to get, and the award was generally considered a mistake. A parliamentary committee sat upon it, and the result was that the work was intrusted to Sir Gilbert Scott by the government. And then that government went out, and Lord Palmerston came in, and after promising the House of Commons to do nothing without their approval, as soon as the session was over he told the architect that he would cancel his appointment if he did not change the style from that of which he was the acknowledged master, to

[1] A Book on Building. By Sir Edmund Becket, Q.C., LL.D.: London, 1878.

another in which he had never built at all; and so that competition went in every way for nothing. And so did another and still greater one, viz., that for the long-expected Law Courts, which arose from the offer of the Society of Lincoln's Inn, to build new Courts of Equity in 1859 for a guaranty of interest on a sum which will probably be exceeded by the salaries of the architect and the clerk of the works before the job is done. Then we had all the parade of a great Royal Commission, and the publication of a Blue-Book of elaborate conditions and instructions, and an exhibition of designs in a building erected for the purpose, and the appointment of a sub-committee to choose the best design of persons with as much architectural experience as those who awarded the Foreign Office prize; and then a decision of the Crown and its law officers that these great lawyers, as two of the committee were, had exceeded their powers by recommending two architects instead of one, because they preferred the architecture of one and the internal arrangements of the other. And so at last the architect was again appointed by the first commissioner of works, and by an odd coincidence, the very same (Lord J. Manners) who had appointed the architect for the Foreign Office ten years before, as it there had been no competition."

Disbelieving altogether in the efficacy of competitions, he yet sees that they are not likely to be soon abolished, and tries his hand at a series of conditions under which the worst evils of the system might be avoided. These contain nothing which has not been laid down repeatedly by American architects, except a provision that specifications be required, "embracing every thing except furniture, necessary to fit the building for its purpose;" also that the acceptance of any plan shall depend on its being capable of execution within a given sum, this meaning that a contractor shall be found who will undertake it for that sum, and furnish sureties in one-third the amount.

On the responsibility and powers of architects, as also on their charges, Sir Edmund Becket writes with a vivacity evidently inspired by the memory of many a hard-fought fight. Three things in the common practice of the profession chiefly rouse his ire:—

First, That architects once in charge of a building insist on carrying it through without interference from the owner, and often in opposition to his wishes, and that the common form of contract with the builder has and is meant to have the effect of enabling them to do so.

Second, That they claim the ownership of the drawings made in carrying out a commission, in spite of the decision of English courts of law to the contrary.

Third, That in charging for service, their commission is fixed at five per cent, but is liable to be increased to double that sum by additional charges.

The author says that the common impression among persons about to build is that the only alternative to a competition is to select a competent architect, tell him what you want and are prepared to spend, and then "throw the responsibility all on him." This is by no means the notion or the practice of Sir Edmund Becket. His own method is to keep the responsibility to himself, holding his architect well in hand, and watching him all the way through as a cat watches a mouse. A client who will not do this must "sit still and see any number of blunders committed which he will either have to submit to forever, or else to pay some other architect for pulling the house to pieces after it is done, to try and cure them."

The author therefore believes in interference, to what extent he admits it is difficult to state with precision. "But the expediency of interfering more or less is one thing, and the right of a man not to be made to pay for doing things for him on his own ground contrary to his expressed wishes is another. Very few people are aware that every building contract prepared by an architect negatives this right altogether, and that architects distinctly deny it. The legal effect of the common form of contract is neither more nor less than this: The contractor shall build, whatever it is, according to the plans, for so much money; but the architect may order any addition or alteration that he pleases, either before or after any of the work is done, without consulting the employer, and even though he may object; and the employer shall pay for it at a valuation, and shall also pay the architect a further percentage for designing it, and a further one besides for valuing it, unless some other valuer is employed and paid, which is as bad. It was in that way that the Houses of Parliament were made to cost six times the original estimate, notwithstanding all the work was done by contract. . . .

"This doctrine of unlimited submission of the employer to his architect is avowed without disguise in the latest architectural books. The author of the 'Choice of a Dwelling' doubtless knew that he expressed the opinion of his fraternity in saying, 'After the plans are settled, and the work commenced, it must be distinctly understood that the "client" yields himself absolutely to his professional adviser.' If architects imagine that by calling their employers *clients* (as some tradesmen now call their customers when speaking of them, though they take good care to call them *patrons* when asking for their patronage), they are *ipso facto* demonstrating the duty of 'yielding absolutely to their professional adviser,' they are very much mistaken. A client can stop his lawyer from proceeding a day longer than he likes, or from taking any step that he objects to, or discharge him in a moment. . . .

"The same doctrine of submission was, moreover, laid down with peculiar emphasis, from the chair of the Royal Institute of British Architects, at their annual meeting in 1871, when the president of the year said that although he, like nearly everybody else, was far from approving the published design for the Law Courts, yet he considered it the duty of the nation to yield itself absolutely to Mr. Street, now that he had been intrusted with the work. On which it is at least amusing to remark, that the nation through its official representative, the First Commissioner of Works, had just then compelled Mr. Street and all the other architects employed by the government to submit to terms of exactly the contrary kind." Concerning the claim which the profession have always maintained to the ownership of the plans, as instruments of service, Sir Edmund Becket declares that no custom can establish the right of a professional association to "invent new rules, and set them up as binding on everybody else;" and furthermore, that the Court of Exchequer has rendered a decision on this point, in the course of which the judges, with a truly judicial calmness and moderation, said that such an attempt to supersede the common law was "contrary to reason, good sense, and justice; impossible, suicidal, cutting its own throat by its absurdity as soon as it was produced." The language sounds much more like Sir E. Becket than like our idea of an English justice, but it is quoted from the report of the case of *Eddy v. McGowan*, 1870.

Our author is most sarcastic when he comes to the schedule of charges issued by the R. I. B. A., that "highly respectable trades-union," as he calls it, adopting the civil sneer of the *London Times*; and feels bound, "when architects tell us that the schedule or 'private code' is calculated to prevent disputes, and that people may learn what they are to pay their architects in every possible contingency, by buying it for threepence at their house in Conduit Street, — to answer as a lawyer that it is nothing of the kind, but the direct contrary; and to warn employers that all that can be deduced from it is that 'five per cent on the cost of the work executed from the architect's design' is the very least that they will have to pay, in the absence of some special agreement, and that the maximum may be ten per cent and sometimes more. I have known that and more charged, and sometimes paid with grumbling and sometimes properly refused."

But now he rejoices that the schedule has been thrown over by the architects in the new arrangement with the Commissioner of Works which specifies that the architect's remuneration shall be a fixed sum to be agreed on beforehand. "The leaders of the profession having adopted that arrangement with their largest employer, the public, any others are, and I know consider themselves, as Mr. Burges says, at liberty to do the same and agree to any terms they like." The form of contract with the architect which is now adopted by the British Government covers substantially all the points enlarged upon by Sir Edmund Becket. We venture to reproduce the sense of it here, A. standing for architect, and C. for commissioners or committee.

1. The A. will prepare sketch plans, elevations, and sections of the intended building, having regard to the proposed cost, so that a contract might be made for it, including fixtures and fittings, warming, ventilating, lighting, boundary-fences, lodges, and every other work necessary to render the building fit for occupation, except furniture, for the proposed amount.

2. If the C. abandon the intention of executing the building, the A. shall be entitled to a sum to be fixed beforehand, and to the return of his sketches.

3. If the sketches are approved, with or without modifications, and the C. desire to proceed, the A. shall by a day to be named prepare working-drawings and specifications for competition by builders.

4. The drawings and specifications shall be full and complete so as to enable the C. to enter into a contract with a responsible builder.

5. If the most approved tender exceeds the amount proposed, the A. shall, if required by the C., revise his plans so as to bring the expenditure within the prescribed limit.

6. The plans and the documents relating to the works shall be the property of the C., and the A. shall make at his own expense all copies of them necessary for the conduct of the works.

7 and 8 are merely formal as to certificates and clerk of works.

9. The A. will be at liberty to vary architectural details, provided such alterations do not involve extra cost, but shall on no account incur any increased expenditure without sanction of the C. in writing.

10. If any additional or substituted works become necessary, the A. shall furnish the plans, etc., as soon as possible.

11. The A.'s remuneration shall be a fixed sum, to be agreed on beforehand; and one third of it shall be paid to him on the execution of the contract, another third when one-half the contract price has been paid to the builder, and the rest when the last payment has been made to the builder.

12. If after working-drawings have been made, the C. do not proceed, the A. shall be entitled to a fixed sum, to be agreed on beforehand, and the plans, etc., shall belong to the C.; or if they proceed only with a part of the works, the A. shall be entitled to

a proportionate part of the remuneration mentioned in (11), in addition to a proportionate part of the sum mentioned in this article, in respect to the works abandoned.

13. The A. shall be entitled to nothing more, except for alterations and additions made by the written authority of the C.

14. In that case he shall be entitled to such increased remuneration as may be agreed on, or determined by arbitration.

15. If the A. becomes incapacitated, or dies, he or his representatives shall hand over to the C. all plans and papers relating to the works, and shall be entitled to such equitable proportion of the unpaid part of the said remuneration as may be agreed on.

16. Disputes to be settled by an arbitrator appointed by the Treasury.

17. No rules of the R. I. B. A. or any other society to be held binding on the C.

This agreement, or something equivalent to it, Sir Edmund Becket earnestly advises all persons to require, before trusting themselves to a member of this dangerous profession, — and this is the moral which all his previous objurgation is meant to enforce.

In respect of which it occurs to us to say that all this abundant, half-indignant, half-contemptuous complaint against the architects of England is not to be regarded as only the angry outburst of a choleric old gentleman with a pet grievance, which he is fond of talking about as loudly as possible. There have been too many similar though less vivacious witnesses, with portions of the same story to tell, and with the same lesson to deduce from it, *viz.*, "Don't put yourself too much in the power of your architect, or even if possible get along without him altogether." It is not many months since this feeling grew so strong among official men in London as to push the Commissioners of Works to consider whether in the case of the great government buildings, the public would not be better served by dispensing with professional service and putting the work in charge of the Board Surveyors, with a corps of draughtsmen. The remarkable advice given by Professor Huxley to the Trustees of the Johns Hopkins University at Baltimore indicates the same feeling among non-official persons.

These things are, in our opinion, to be regarded as the signs of a growing dislike in England towards the profession, on the part of its employers; a dislike arising not so much from distrust of its competency, as from a feeling of injury and resentment at its pretensions and the liberties architects are supposed to take with their employers' money. The instances of absolute and conspicuous incompetence on the part of architects are comparatively few, and, like the mistakes and failures of men in any other calling, though loudly condemned when they occur, have little to do with the attitude of the public towards the main body of the profession. It is not by its failures, but by its successes, that any profession is to be judged. And certainly the history of British architecture during the last generation is brilliant enough to put to shame any complaint on that ground. The grievance really lies, we suspect, just where Sir Edmund Becket's book indicates, in a certain impetuousness in the treatment by architects of their employers; an unwillingness to receive instructions, and a still greater unwillingness to follow them; an eye to splendor of architecture as against convenience of plan, and to the magnifying of the architect as against the comfort of the client. In short, the grievance is in the nature of a personal grievance, and concerns the personal behavior and manners of the profession. It is time this was said, and that those who have taken up so noble and serious a calling should make up their minds to eschew the small vanities and jealousies and touchy sensibilities which have ever been the reproach and ridicule of those who follow art in any of its branches, but which are nowhere more out of place, and more unnatural.

We wish it could even be said that this unworthy temper is confined to the intercourse of architects with their clients. It is impossible to read the professional papers of London without amazement at the absence of good feeling and of good manners; the peevishness, distrust, intolerance, and jealousy which mark the intercourse of architects with each other. From the days of Sir Charles Barry, when his brethren signed a petition to the government to set aside his design for the new Parliament-houses and order a new competition, down to these later days which have witnessed the frantic abuse of Mr. Street after the Law Courts competition, and of Mr. Burges during the contest over the decoration of St. Paul's, it has seemed as if any conspicuous success of a prominent architect in a competition were the signal for his fellows to open upon him in full pack.

It is our happiness to believe that the architects of our own country, while yielding now and then in some measure to the besetting weakness of the profession, have generally been able to maintain their intercourse with each other on a higher footing of mutual confidence and respect. We ought nevertheless to recognize the tendency which undoubtedly does exist, and to strive by every means in our power to strengthen among us the habit of good feeling and professional comity to that extent that it shall be proof against any emergency of temptation.

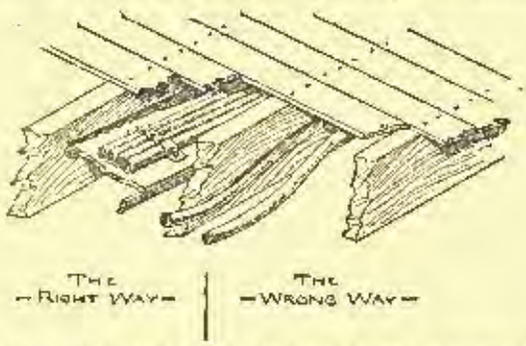
DECORATIVE ART. — The ladies of Saratoga have formed a society of decorative art, which is to be, like the Boston one, an auxiliary of the New York society.

MODERN PLUMBING. — II.

LAYING PIPES.

LEAD pipes are put up with brass bands, and "tacks," which are small flat castings of hard metal, soldered at the middle or edge to the pipe, and then screwed to the board on which the pipe runs. The brass bands are used where several pipes run so close together that there is not room for tacks, and are strips of sheet-brass, bent to fit the pipe, and fastened by screws at the ends. There should be enough points of attachment to prevent the pipe from sagging or getting out of place by the contortions which expansion causes in it; and iron hooks and nails, which cut their way into the lead as it moves, should be avoided.

Pipes should never run, as is often seen, suspended between the beams of a floor. If it is necessary to carry them between the

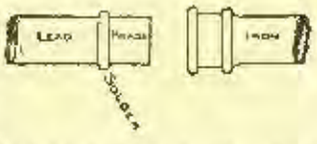


floor and ceiling, boards should be fitted in at the proper inclination, and the pipes laid on them; then there will be no danger of sagging, with the probable consequence of a torn or burst pipe in the worst possible place. After the pipes are so laid, it is well in country houses to fill in around them with sawdust or planing-mill chips, and the floor over them should be screwed down. However, pipes should not run under floors or in partitions if it is possible to avoid it, but always on boards fixed to walls or ceilings of kitchens, closets, or store-rooms, so that the whole length is easily accessible.

Lead pipes are joined by flanging out the side or end of one into a rude cup, and sharpening the end of the other to fit into it; the portions next the joint are then scraped bright, and at a certain distance rings of lampblack and grease are "smudged" around each pipe, and a mass of hot solder wiped around the junction, which adheres to the bright parts, but not to the lampblack, thus making a neatly defined oval lump.

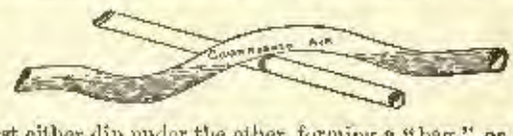
The quality of the solder is important. The smallest taint of zinc, even a few filings in a pot of solder, renders it brittle and unfit for good work. Commercial solder usually contains a little impurity of this kind, which has to be removed by burning with sulphur. The solder is melted and kept red-hot, and stirred with a lump of sulphur, which must be kept always below the surface to prevent its taking fire. The zinc is gradually separated and rises to the surface as sulphide, and is skimmed off, leaving the solder pure.

Lead can be soldered perfectly to lead or tin, and also to brass or copper, if the surface of the brass or copper is cleaned with acid and roughened with a rasp to make the solder adhere, but not at all to iron. In entering a lead into an iron waste-pipe, a poor plumber fills the joint with putty, which cracks or is eaten by mice in time; but a first-class workman solders to the end of the lead pipe a brass or copper ferrule, and this when introduced into the iron pipe gives resistance enough to allow the joint to be caulked with melted lead, making a perfect and durable junction.



Iron and brass pipes are joined by means of cast fittings, — branches, tees, bends, sleeves, etc., — into which the pipes are screwed, red-lead paint being first daubed over the screw. Much of the neatness of the work depends on the precision with which the pipes are cut off, and the appearance is seldom so good as a first-class job of lead-piping. Both iron and brass pipes are put up with brass bands. The brass pipes, after they are done, should be varnished with a good coat of shellac, or they will soon corrode and look badly.

The system of pipes should be so laid out that they will not cross each other when running nearly horizontally. In that case



one must either dip under the other, forming a "bag," or, what is nearly as bad, must jump over it, forming a chamber which is soon filled with air which accumulates from the bubbles carried along in the water, and this being pent up, unable to escape either way, stops or greatly checks the flow of water. The necessity of

dodging around gas-pipes often gives trouble in a similar way. Of course a "bag" in a pipe traps it, making a similar air-chamber of the length of pipe adjacent to it, besides its further defect that the water cannot be drained out of it.

In a house with complicated plumbing, the laying out of the work so that all the pipes shall follow their course without interfering, the shut-off cocks shall come in accessible places, and the whole be kept well together, demands skill and judgment of the highest order; and an experienced eye will recognize the thoughtful and thorough workman far more in the precision with which the pipes fall into their places, and the neatness of their lines, and the mode of turning up their ends, than in the shiny fittings or polished marble.

Cast-iron waste-pipes are put up with hooks and straps of iron, and must have a strong support at every joint. The parts are joined by inserting the small end of one into the socket or "hub" of the other, putting in a little hemp or oakum, and then pouring in melted lead or solder, and compressing it with a calking-iron. To lessen the corrosion of the iron, the pipes should be painted. They may be dipped in hot tar, which is good, but makes the pipes disagreeable to handle unless they have a longer time to dry than can generally be allowed. Next to tar, red-lead paint makes the best protection. Two coats should be put on, one before the pipe is put up, to make sure of reaching all parts, and a second afterwards to make the whole neat and uniform. The inside of the pipe can be coated by pouring in liquid paint and turning it around; but it is not usually done, and it is doubtful whether the paint resists the ammonia and other gases inside the pipe long enough to do much good. White-lead paint should not be used unless on top of a coat of red-lead, as it corrodes the iron. If red lead cannot be had, the iron may be whitewashed with common lime wash, and the white-lead paint put over this, which will form a tolerable substitute.

In entering an iron pipe into the drain, care must be taken not to put the iron so far in as to choke the drain: the socket is partly filled with oakum, and cemented with hydraulic cement. It is a great advantage to join the iron pipe to the drain by means of a Y branch, of which one opening is closed only by a plug, which can be removed, and the junction of the soil-pipe and the drain, where obstructions frequently occur, cleaned without disturbing either pipe.

BOOK NOTICES.

QUANTITIES.[1]

Mr. Fletcher's book on Quantities, which was first published as a series of articles in the *Building News*, though mainly adapted to English methods of work, is not without interest to the American reader. It affords more complete and detailed information than we have elsewhere met of the system of measuring and computing both labor and materials, which holds so conspicuous a place in building-operations in both England and Scotland. It is a neatly-printed duodecimo of two hundred pages, the last sixty of which are occupied by a copious index, which adds greatly to the serviceableness of the book; and by a set of tables, some of which are readily accessible elsewhere, but others, as for instance a table of the time to be allowed for various items of all sorts of work, are, so far as we know, unique. The bulk of the book is occupied by a dozen chapters, all written upon the same plan, in which the arts of the excavator, bricklayer, slater, mason, carpenter, joiner, ironmonger, smith, gas-fitter, bell-hanger, plasterer, plumber, painter, glazier, and paper-hanger are successively taken up, the method of measuring work described, special difficulties noted, and variations of usage pointed out. In every case a table is added which "has a double use. It shows the order of taking the items of this trade, and the method of measurement." Throughout the book, enumeration, the most elementary of arithmetical processes, plays an important and most useful part. In estimating, as in making specifications, there is not generally so much danger of getting things wrong as of missing them altogether; and, in this country at least, the elaborate lists Mr. Fletcher has prepared of all the items that need to be considered are likely to be quite as useful in the perfecting of specifications as in the preparation of estimates.

Whether, on the whole, this cumbrous and expensive system of "surveyors' quantities" is worth what it costs, is a question Mr. Fletcher does not raise; and it is not in place to discuss it here. It undoubtedly is of great service to architects, in bringing them, at the outset of their professional career, into immediate contact with every detail of building-operations. It is greatly to be regretted that in this country no such post as that of district surveyor should be open to the rising practitioner, and that in his own practice, the getting out of quantities for the contractors should not be forced upon him. Whether the system is any better for the interests of the work than the system, or no system, generally in vogue in this country, by which each contractor satisfies himself, by methods satisfactory to himself, how much work will be required of him, is quite another question. A skilful antagonist might find in Mr. Fletcher's book a number of statements which he could use, not without effect, as arguments against the practices it is occupied with explaining. "Judgment" still seems a potent factor in the result; and the contractor is at the mercy of the surveyor's judgment, which he cannot tell about, instead of having his own to rely upon.

[1] Quantities: a Text-Book for Surveyors, in Tabulated Form, explanatory of the Best Methods adopted in the Measurement of Builders' Work, etc. By Banister Fletcher, F.R.I.B.A. London: B. T. Batsford, 1873.

KRELL'S DORIC CAPITALS.

A series of profiles of twenty-four Greek Doric capitals, including nearly all the authenticated examples, has been reproduced from the Atlas of Krell's History of the Doric Style, by Mr. F. W. Dean of Cambridge, Mass., for use of the students in art at Harvard College, and under direction of the Professor of Fine Arts, Mr. Norton. They are careful tracings from the drawings in Krell's Atlas, better executed in fact than the drawings themselves, and printed in lithographs of the size of the originals. These drawings give the most complete comparative view of the Greek Doric capital that has yet been prepared, and are accurate so far as accuracy has yet been attained. They are arranged in approximately chronological order, and accompanied by a table that cites the authorities from which they are compiled. We miss any record of the scale of the originals, which would have been of advantage, or any indication of the painted ornaments of which traces have been found in some of the capitals, which might easily have been supplied, and we notice the absence of the remarkable capitals of the Temple of Apollo at Bassæ, and the so-called Portico of Philip at Delos. The book may be had of Mr. Dean, who is to be addressed at Cambridge. The price is two dollars.

THE ILLUSTRATIONS.

HUDSON RIVER STATE HOSPITAL, POUGHKEEPSIE, N.Y. MR. FREDERICK C. WITHERS, ARCHITECT, NEW YORK.

We give an illustration of a portion of the State Lunatic Asylum at Poughkeepsie, N.Y., just built. The buildings were begun in 1868, when the first appropriation for them was made by the State Legislature; and the work has been carried on whenever successive appropriations have been available. The south wing shown by the block plan, ultimately intended for the sole use of males, is now occupied by both sexes. The central building for administrative purposes is now building; and when the north wing, which is intended for the reception of females, is built, the whole will form a group of buildings with a frontage of nearly 1,500 feet. The walls are of brick, the outside ones being built hollow, and faced with Croton fronts. The door-arches and heads of windows are of Ohio and Bigelow blue-stone combined, and the string and eaves courses of Ohio stone. All the partition walls are twelve inches thick, except those in which the ventilating flues are carried up, which are sixteen inches thick. Every room has at least one of these flues carried up to a ventilating ridge in the roof. The cupola shown in the drawings faces the south, and is intended for a promenade for the patients, being open in the summer and enclosed in the winter. The general design was made by Messrs. Vaux and Withers, and the buildings erected in conjunction with Dr. J. M. Cleaveland, the medical superintendent.

NEW CITY HALL BUILDING, PROVIDENCE, R.I. MR. S. J. F. THAYER, ARCHITECT.

This building is built at the westerly end of Exchange Place, Providence, and is bounded by Dorrance, Washington, Eddy, and Fulton Streets. Its façades are of Westerly and Concord granite, the one illustrated being its principal front, and 134 feet 8 inches broad, and 92 feet 4 inches to the top of the masonry. The roofs and dome are built with iron frames, and the decorative features are of cast-iron. The plans were published in the *American Architect* for March 25, 1876.

DESIGN FOR A MORTUARY CHAPEL. MR. F. H. BACON.

This design was made by a student of architecture at the Massachusetts Institute of Technology, Boston, in accordance with the following programme:—

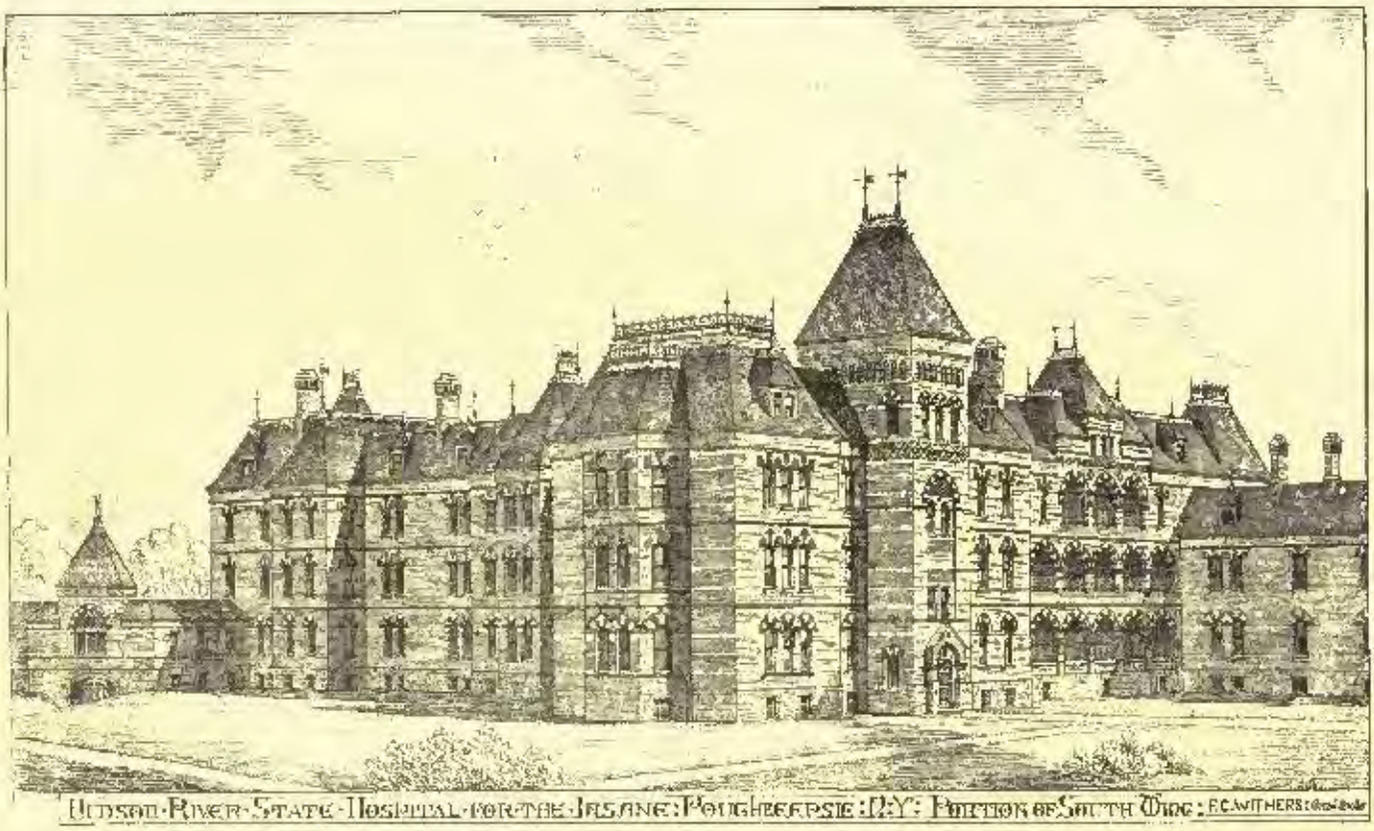
A Temple Tomb.—It is the custom in some countries to erect over a grave or tomb, a small temple or oratory, just large enough to cover it, containing an altar where a single mourner may offer prayers for the dead. It is required to design such a structure, making it in the form of a small Grecian temple, with two columns, *prostyle*, all the details being Greek rather than Roman in character. The plat of ground is supposed to measure six feet by twelve.

Required.—A plan, section, and two elevations, on a uniform scale of half an inch to the foot, with details one-twelfth full size, all on an imperial sheet.

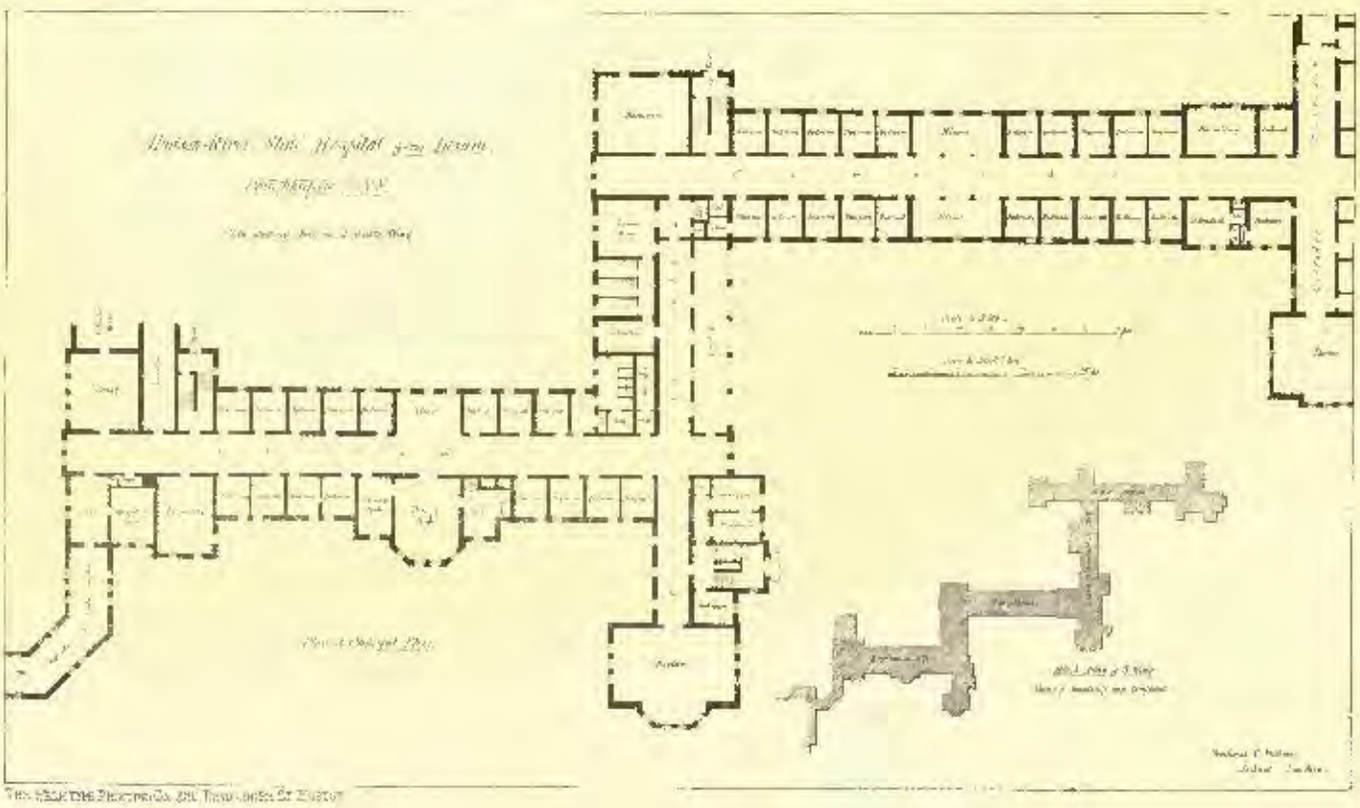
STAIRCASE HALLS. MR. W. W. LEWIS, ARCHITECT.

These staircase halls are to be found in two houses lately built on Commonwealth Avenue, Boston.

Antwerp Cathedral.—It is said that the spire of Antwerp Cathedral can be seen from a distance of a hundred and fifty miles.



HUDSON RIVER STATE HOSPITAL FOR THE INSANE: POUGHKEEPSIE: N.Y.: PORTION OF SOUTH WING: F.C. WITHERS: Gen'l Bldg



FRONT ELEVATION

CITY HALL — PROVIDENCE R I

S J F Thayer Archt

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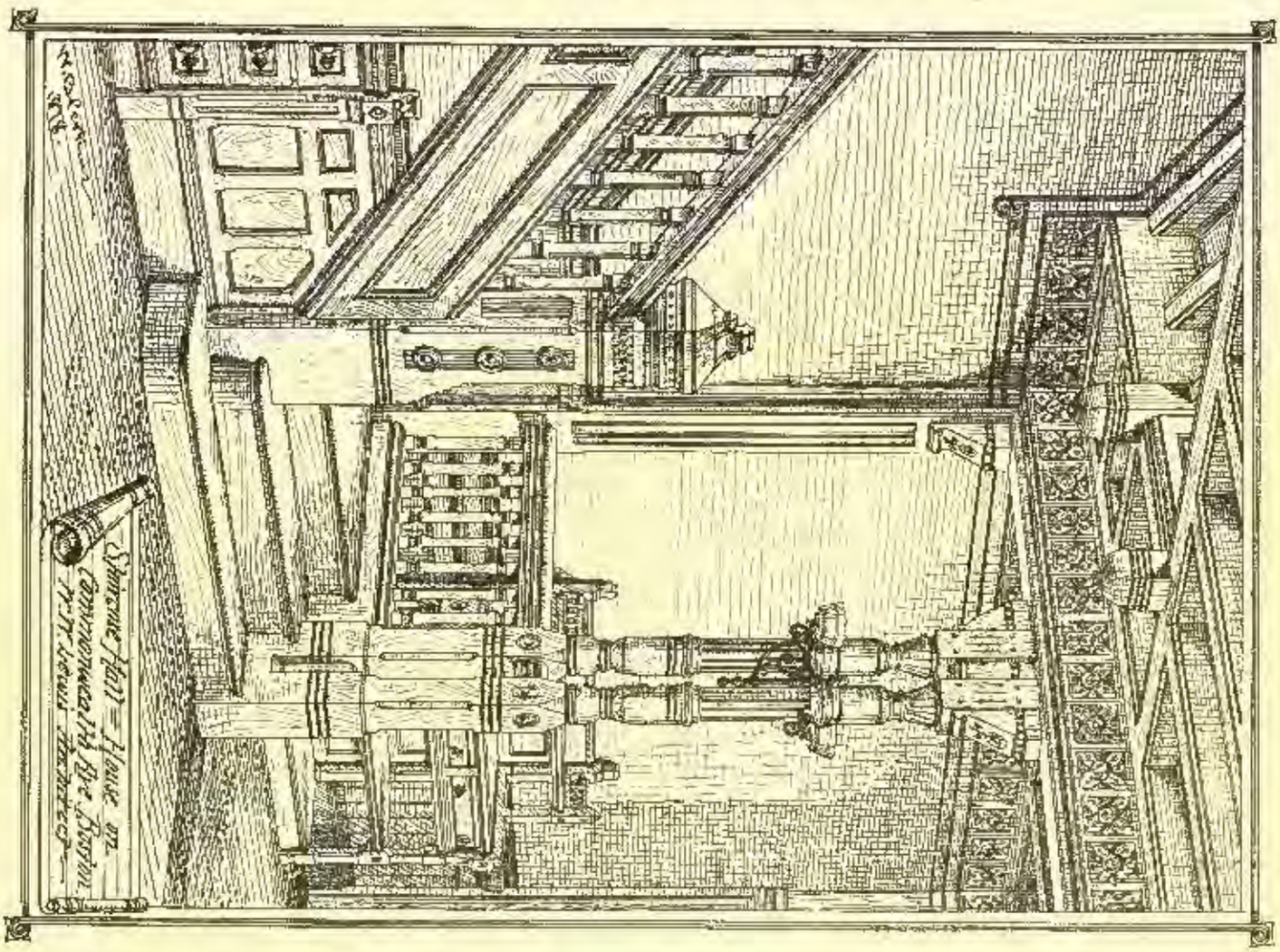
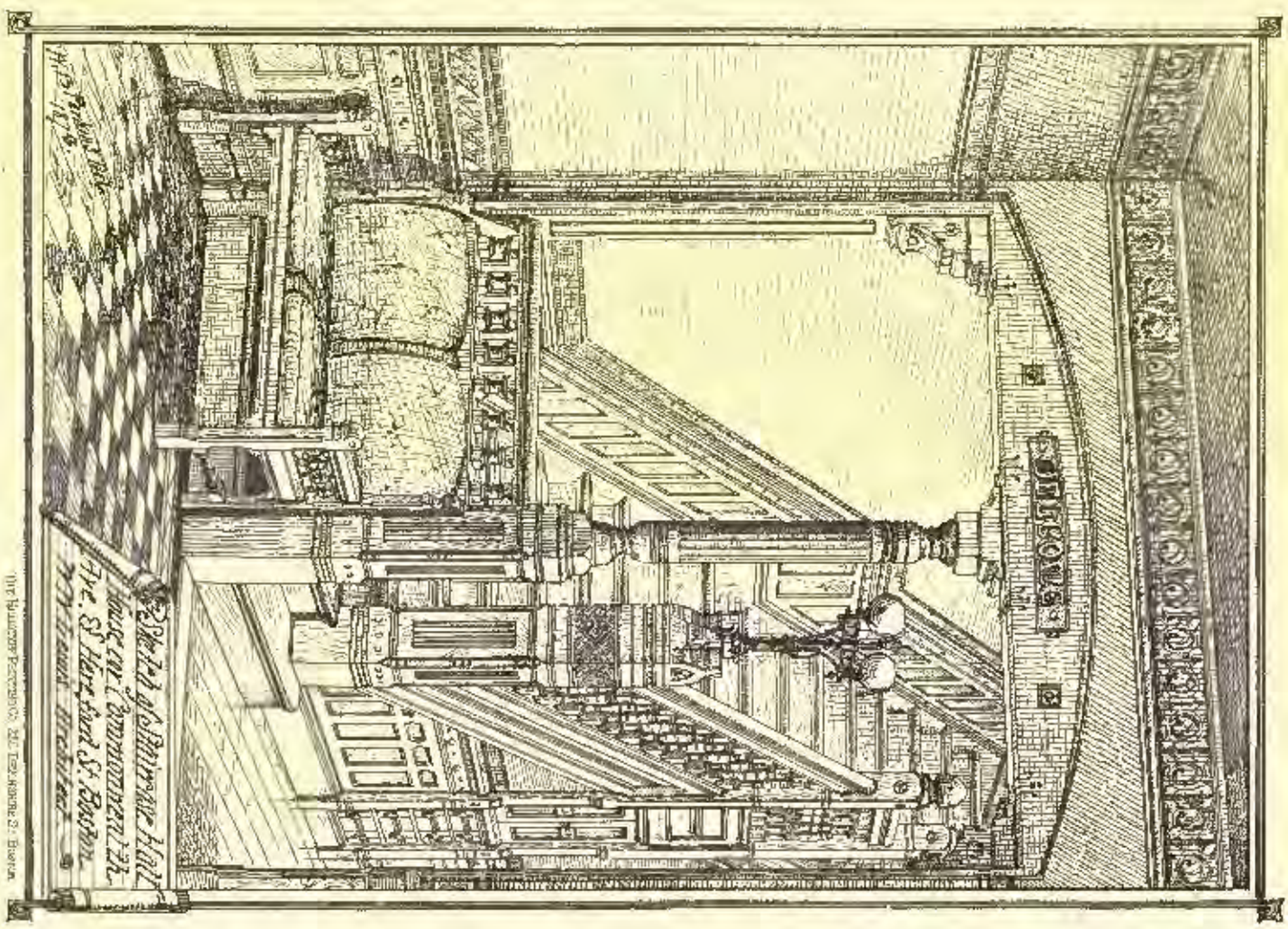
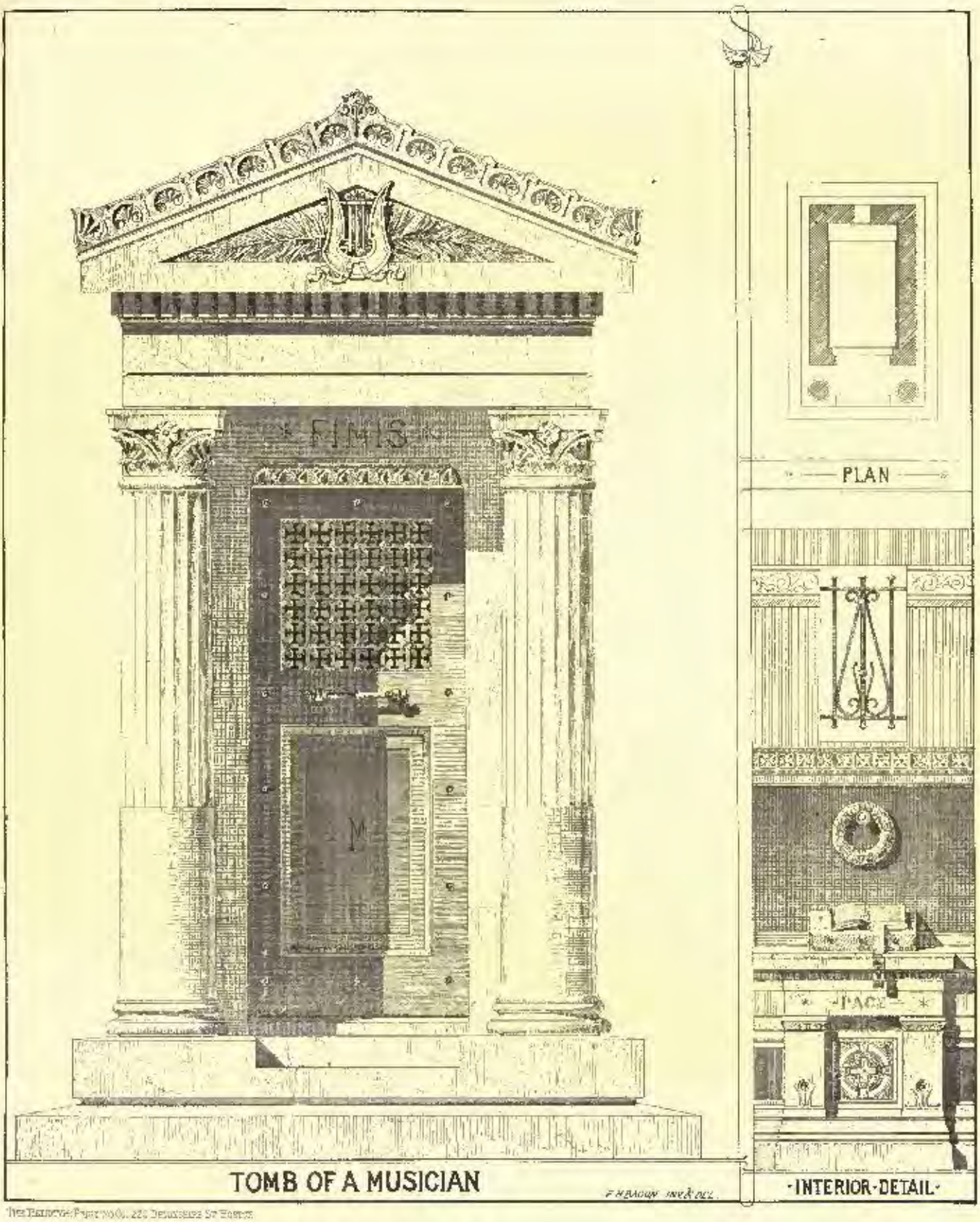






THE BRITTON PRINTING CO., 220 DEVONSHIRE ST. BOSTON.

THE AMERICAN INSTITUTE OF ARCHITECTS.

THE CHICAGO CHAPTER.

A REGULAR meeting of the Chicago Chapter of the American Institute of Architects was held at the Tremont House Club-Rooms, March 7, 1878.

President Baker in the chair. Minutes of the last meeting read and accepted. The President had received a letter from Mr. Robert Loebnitz, formerly a partner of the President, tendering his resignation as member of the Chicago Chapter,—he having become a resident of Wiesbaden, Germany. On motion the resignation was accepted, and Mr. Loebnitz was nominated by the Chapter to the position of honorary member of the American Institute of Architects; and the Secretary was directed to communicate the action of the meeting to the Secretary of the Institute.

At the request of the Treasurer that some bank be named as depository for the funds of the Chapter, the Chapter designated the Commercial National Bank.

The subject of cements and their uses on concrete and other masonry was discussed at length. This led to the subject of the strength of brickwork,—notably of brick beams, so-called. Some instances of the remarkable bearing strength of beams of old brickwork were cited.

Steps are being taken by the Chapter for the establishment of rules for the measurement of all kinds of building-material,—hoping to secure the co-operation of all architects and contractors and to fix standards of measurement. The subject will be discussed at the next meeting. Adjourned.

PAINTING AND SCULPTURE AT THE CENTENNIAL EXHIBITION.—V.

[The report of Mr. John F. Weir in behalf of Group XXVII., embracing Plastic and Graphic Art.]

THE UNITED STATES.

It has been frequently charged that American art derives its inspirations, as well as its style and technical discipline, from the schools of Europe. But it requires no very intimate knowledge of its real characteristics to discern that this assertion has no foundation in fact. The character of our art in general is decidedly varied, it is true; but it is quite possible to discriminate between that which is distinctively American and bears the unmistakable stamp of originality, and that which is either the work of artists of foreign birth residing in this country, or of Americans residing abroad and adopting the manners of foreign schools. The distinction is clear enough, and one that is easily recognized. In landscape-painting it is not an exaggerated estimate of American art to claim for it merits that are unsurpassed by the contemporary art of any people. In *genre*, also, there is evidence of original aims derived from the conditions of our life and character, though in a less marked degree than in landscape. Nor is it a matter of surprise that American art should have made such rapid progress in its development, when we consider the fact that our civilization is not the result of a slow and gradual advance from barbarism, but that its original elements were derived from peoples already matured in the civilizing arts under old and experienced systems of their own. The forming influences in our national life have not only had a high intellectual origin, but from the earliest dawn of our existence as an independent people this character has been sustained by our scholars, men of letters, and scientists, who have filled no subordinate place in the general intellectual progress of the past century. And, although laboring under the peculiar disadvantage of surroundings almost destitute of every thing that tended to promote a knowledge of art in the earlier days of our history, our older artists were not less widely esteemed than our representative men of other professions, nor were their merits less conspicuous. Allston, Copley, West, Stuart, Trumbull, and Newton were no less favorably and widely known in Europe than in their own country; and it may be affirmed of them without extravagance, that at that time—at the dawn of the present century—there were few artists of greater merit in any country, so recent a thing is the extraordinary and prolific development of art in all its branches which we witness to-day. And it cannot be said that this development, in all cases, is intrinsically what it appears on its face to be,—a march of progress. The technical resources of the arts have been enlarged and perfected, skill and method have been acquired through discipline, and the training that is requisite for successful competition in the arts is now necessarily severe and prolonged; yet it would be difficult to discern in the portrait-painting of the present time, in any country, a better style or higher order of excellence than is manifested in the portraits of Copley and Stuart. In short, the progress is one of technical externals rather than of genuine artistic aims—the expressive and thoughtful—which give value to art.

In historical painting, West, Allston, Trumbull, R. W. Weir, and Leutze have produced works well worthy of respect. In *genre*, also, there has been a natural and spontaneous expression of American life and character. Mount and Edmonds may be said to have originated with us this class of art, which has attained a conspicuous place of late. But in landscape the development of American art has been marked by originality and decided excellence. The strong tendency towards this class of painting may perhaps be accounted for by the fact that until recently the means for acquiring discipline in art have been of the most meagre kind, and the study of the human form was supplanted by the influence and beauty of our natural surroundings, particularly in its wild primeval grandeur. This partially filled the void occasioned by a lack of historic and artistic influences, and supplied an aim that has been fruitful of genuine results. Some years since, a few American landscapes found their way to the exhibitions of Antwerp and Brussels, and a distinguished Belgian artist declared "the works of American artists there exhibited to be among the most characteristic of the kind ever brought to that country." In that branch of art the United States suffered little by comparison with the best works of foreign schools, nor were its individuality and merit impaired by this juxtaposition. In *genre*, however, the comparison was decidedly unfavorable for us, especially when contrasted with the technical skill and thorough discipline manifested by the French and Spanish schools. Yet even in this class of painting originality of aim was conspicuous, as shown in the works of LaFarge, Hunt, Vedder, Benson, E. Johnson, Homer, Perry, and others,—the last three selecting their subjects exclusively from American life and customs, and with marked individuality of treatment. The first occasion wherein American art was brought in contact or competition with foreign art was at the International Exposition of 1867. The collection was small, numbering but seventy-five pictures, but for the most part it was well selected. An intelligent critic of the Exposition of 1867 wrote: "The American collection, as a whole, attracts attention, and has been very highly praised by the first artists of France."

But the International Exhibition at Philadelphia was the first opportunity for an adequate display of American art on its own ground, and under what should have been considered favorable circumstances had not this been partially frustrated by an indiscriminate admission of unworthy works. But notwithstanding this defect, the exhibit, as a whole, was a creditable one.

A feature of marked interest was the exhibition of the works of our older portrait-painters who link the present with the past century, as Gilbert Stuart, Copley, Allston, Morse, Newton, Trumbull, Jarvis, Inman, Sully, and others. Of recent portrait-painting there were admirable examples by Elliott, Furness, Stone, Huntington, Baker, Gray, Healy, Hunt, Page, Hicks, Shigg, Le Clear, Porter, and Miss A. M. Lea. Mr. Huntington's style is pleasing, correct in drawing, and always characterized by refinement of feeling. Mr. Baker is particularly agreeable in his treatment of female heads. Mr. Hicks's portrait of Gen. Meade is manly and vigorous. Mr. Page seeks the more subtile modulations of form, and his portraits are suggestive, luminous, and skilfully executed, but with a peculiar method which renders them not always agreeable. His art, however, is always thoughtful and expressive. Mr. Porter's style is one of refinement and pleasing in color, in which qualities Miss Lea's portraits, also, are conspicuous for merit.

In *genre* the most noteworthy examples were by Boughton, E. Johnson, LaFarge, Homer, Perry, Leutze, R. W. Weir, Vedder, Rosenthal, Chase, Shade, Shirlow, Loop, Benson, Bridgeman, Gray, Brown, Irving, Henry, Yewell, W. Thompson, W. H. Beard, Wood, C. C. Colman, and others; and in landscape-painting notably the works of Cole, Durand, Kensett, Gifford, McEntee, Church, Whittredge, Suydam, Hubbard, S. Colman, Swain Gifford, Cropsey, W. T. Richards, Bierstadt, Hetzel, De Haas, E. Moran, Bellows, D. Johnson, Miller, Bristol, Hill, Martin, Shattuck, James Hart, Van Elten, William Hart, Hamilton, Gay, Tilton, Fitch, etc. It is not to be inferred that the works of these artists are all equal in merit; but on the whole, they represent American art in a general and diverse way. Their names have become familiar to the public, and their several merits have received more or less recognition.

Cole and Durand may properly be termed the fathers of American landscape. They first effectually inspired the artistic mind with sympathies whose influence is still felt. Cole was truly a poet in sentiment, and his simple landscapes possess a charm which time does not mar. Durand likewise stimulated into activity that latent feeling for this branch of art which has become a marked feature of the American school,—if the term is admissible,—and his rendering of landscape is extremely sensitive and refined.

The late Mr. Kensett was represented by two of his most pleasing works,—"Conway Valley, New Hampshire," and "Lake George," the quiet and subdued sentiment of which is characteristic of his graceful manner. A serene and tender pastoral, and the more subtile modulations of tone in the landscape, had for him the greatest charm.

Mr. S. R. Gifford was represented by his "Sunrise on the Seashore," of which it may be said that the sea and its solitudes have seldom inspired a more profound motive, or one more adequately rendered, than in this picture. "Tivoli" and "Lake Geneva" are no less admirable, but with a very distinct sentiment; and "Palanza, Lago Maggiore," has a full, flooded sense of light, modified by tone, that is in every respect masterly in treatment. Two pictures by the same artist, "Fishing-Boats of the Adriatic," and "San Giorgio, Venice," are as strong and pronounced in color as

the former works are delicate and suggestive. This artist is varied in his powers, and sustained, free, and finished in his methods. His pictures always manifest great elevation of thought and feeling. They are the interpretation of the profounder sentiments of Nature, rather than of her superficial aspects.

Mr. McEntee was represented by "October Afternoon," "November," "The Woods of Ashokan," Frosty Morning," and "Late Autumn." These pictures are all characterized by great sincerity and decided poetic feeling. They evince a subdued yet intense enjoyment of those phases of nature that are tinctured with melancholy, and which are therefore none the less beautiful. This artist's style is expressive and sensitive, and, within the scope of his strongest sympathies, mature and confident. His pictures evince a profound insight that is intolerant of that Denner-like portraiture in landscape, which aims at minuteness of imitation. They possess qualities of excellence, that in some respects are unsurpassed in this branch of art.

Mr. Church contributed his "Chimborazo," which, while it is representative of his peculiar style, is not one of his best works: it is not equal to his "Niagara" or "Heart of the Andes." The eminent ability displayed by this artist in the works last mentioned merits high praise, and has been widely acknowledged. Mr. Church views the landscape with the cool deliberation of the scientist, rather than with the intensity of the artist: his estimate of its values and its facts, therefore, is rather scientific than artistic. His art is always attractive and brilliant, but has a tendency towards accumulation of detail, in lieu of fulness of sentiment. His merits, however, are so generally recognized, and have so properly won for him the distinction due to brilliant talents, that his work rarely fails to attract attention and elicit praise. "Chimborazo" is one of a series of pictures, the materials for which were sought in another continent; and the extraordinary enterprise manifested by this artist in visiting remote latitudes in search of subjects for his pencil was a feature of his art that has since found numerous imitators. But Mr. Church is not insensible to the fact that all the materials requisite for great art may be found always near at hand, and even among what is termed mere commonplace.

Mr. Whittredge contributed his "Rocky Mountains, from the Platte River," "A Home by the Sea," "A Hundred Years Ago," "Twilight on the Shawangunk Mountains," and "The Old Hunting-Grounds,"—the latter an especially admirable example of his free, nervous style, and of his felicitous treatment of wood-interiors. Mr. Whittredge's pictures of forest solitudes, with their delicate intricacies of foliage, and the sifting down of feeble rays of light into depths of shade, are always executed with rare skill and feeling. His style is well suited to this class of subjects: it is loose, free, sketchy, void of all that is rigid and formal. It evinces a subtile sympathy with the suggestive and evanescent qualities of the landscape. But in his treatment of the open sky this artist is less happy; there is sometimes apparent a slight crudeness in his rendering of this feature of nature, that is open to unfavorable criticism. His pictures, however, always express a sincere and true motive.

Mr. Bierstadt contributed his "Yosemite Valley," "The Great Trees of California," "Mount Hood, Oregon," "Western Kansas," and "California Spring," no one of which equals his "Rocky Mountains," which some years since acquired a great and merited reputation, and was a work of exceptional power. The earlier works of this artist showed a vigorous, manly style of art that had its undeniable attractions. His pictures exhibited at Philadelphia indicate a lapse into sensational and meretricious effects, and a loss of true artistic aim. They are vast illustrations of scenery, carelessly and crudely executed, and we fail to discover in them the merits which rendered his earlier works conspicuous.

Mr. S. Colman sent his "Merchant of Laghouats *en route* between Tell and the Desert, Algeria," which is characterized by the agreeable manner this artist has been pleased to adopt. There are some manners, or methods of treatment in art, that are so intrinsically pleasing that they appear to be exempt from the criticism that usually deprecates pronounced formalities of style; and Mr. Colman's manner is one of these. It is attractive, thorough in its technical method, pleasing in color, and in every other respect than that of composition—in which it is perhaps too formal—it is admirable and artistic. A little seeming negligence or unstudied effect in composition would produce a more agreeable result; and yet this very thoroughness of discipline in Mr. Colman's work offers a contrast to the not unusual weakness of our art in these particulars. Mr. Hubbard exhibited his "Early Autumn," "Coming Storm," and "Glimpse of the Adirondacks,"—the latter a characteristic example of his style, and luminous in its cloud-effects. Mr. Hubbard is particularly pleasing in his treatment of summer landscapes and afternoon skies, in which class of subjects his art is attractive, and often brilliant in its rendering of light and atmosphere, yet with a quiet and subdued tone. His style is not always equal, but it is expressive of true artistic sensibility and sincere motive. Mr. Bristol has lately acquired a more thorough manner, and his picture of "Lake Memphremagog" has decided merit. The evanescence of lights and shadows over the summer landscape is well expressed. Mr. W. T. Richards contributed but a single oil-painting, "The Wissahickon,"—not one of his best pictures. This artist is a careful, conscientious student of nature, but it is only recently that he has permitted himself to exercise that freedom and largeness of vision characteristic of mature art: his later works manifest this in a marked degree. No painter is more thoroughly master of the sea, and waves in motion, than is this artist. Mr. Thomas Hill exhibited his "Yosemite Valley," a large picture, and superior to any thing of the kind in the Exhibition, in the way of attractive and realistic representation of scenery, strikingly grand in its own elements. Such representations have held a prominent place in American landscape-art. They appeal with force to the popular taste; and while they are very distinct in their aim from the ends sought in more mature art, which is less dependent on novelty of materials, they are not without decided power when treated with the ability displayed by Mr. Hill, or as formerly rendered by Mr. Bierstadt. Mr. Miller contributed his "Returning to the Field," "The Road to the Mill," and "High Bridge, New York," all of which show decided merit with a strong foreign accentuation. Mr. De Haas exhibited "Moonrise and Sunset," and "A Brig hove-to for a Pilot," both marked by a strong German manner, brilliant in effect and vigorous in treatment, though somewhat formal. Mr. Hetzel exhibited a "Forest Scene in Pennsylvania," which was particularly pleasing and effective. Mr. James Hart was represented by a single picture, "A Summer Memory of Berkshire," which was an agreeable rendition of quiet pastoral landscape. Mr. Cropsey contributed "The Old Mill," and "Italy," two pictures very cleverly rendered, though with a peculiar manipulation characteristic of his style, which is often pleasing. Mr. Swain Gifford exhibited "Boats at Boulah, on the Nile," and "An Egyptian Fountain," which show admirable vigor and breadth of treatment. Mr. Swain Gifford is best known through his Eastern pictures, in which his rendering of Oriental life and atmosphere is peculiarly happy. Mr. Gay exhibited "Windmills at Delfthaven, Holland," a very admirable picture, true in sentiment, and skilfully executed.

FOREIGN ARCHITECTURE AT THE CENTENNIAL FROM A FRENCH STAND-POINT.

[See p. 408, vol. I., and p. 57, *ante*.]

The architectural drawings of the English section are to be found in a small hall of the Art Gallery. Fourteen artists, of whom several are of great merit and reputation, took part in this exhibition. Here, again, we find perspective views with landscapes, and but very few plans.

Mr. Aitchison exhibits a view of the painter Leighton's studio. This building is not especially interesting. It includes the studio which takes up the whole second story, and the apartment on the ground-floor. Furniture in black wood, inlaid, and some interior decorations, complete his exhibition.

Mr. Burges, who received a medal, exhibits under No. 9 a view of the new Law Courts in London, an important building with a high square tower, in the Gothic style after the English version. The Cardiff Tower is another square tower, similar in kind to that of *Jean sans Peur* at Paris. The Cathedral of St. Finn Barr, recently built at Cork, as shown in a perspective view, is partially hidden by trees; this is rather a water-color than an architectural drawing.

Mr. Cooke displays a large college similar to all its class in England; Gothic buttresses, a square tower rising in the middle of the façade between two gabled wings of less height, form a design of no great interest.

Mr. Penrose exhibits a notable scheme for the decoration of the dome of St. Paul's in London. It is illustrated by photographs of the colored drawings. A wide band with figures of musicians and singers encircles the round opening of the lantern; lower down on the dome, eight arches, divided horizontally in two, descend to the springing of the dome, and display, each, two compositions. The composition is classic, but unfortunately rendered on too small a scale to enable one to properly appreciate its true value. Mr. Penrose received a medal.

Mr. Smirke exhibits a pleasing water-color sketch of a pavilion for the South Kensington Museum. It has a very attractive appearance; glazed bricks give an additional grace to the Italian Renaissance as treated by the author.

Mr. Spiers, who studied at the *Ecole des Beaux-Arts* at Paris, sent to the exhibition his design for the *Eglise du Sacré Cœur de Montmartre*, which had already honorably figured at Paris among the other competitive designs for the same building. We have by the same artist a perspective view of a restaurant on Piccadilly. The composition of the main entrance is well studied, and the *entresol* with the high arches above it, which light the great hall, gives a very harmonious general effect. No. 36 shows the spacious and well-decorated vestibule of the same restaurant.

Under No. 89, Mr. T. H. Wyatt exhibits an Exchange Building for Liverpool. This is a large palace in which we find reminiscences of the Louvre, but its general decoration is perhaps a little meagre. The same artist, who received a medal, displays two other designs,—a city house of a rather monumental aspect, and

[1] Mr. Spiers was from the *atelier* of M. Questel, and by his talent he does credit to the French masters.—*Ed. Revue Générale.*

a house with outbuildings and offices. Slate roofs with separate bands of deep color, and brick walls sharing the same peculiarity, give an appearance to the whole suggestive of Scotch plaid. The water-color rendering itself is very agreeable and successful.

The most interesting part of the English section of architecture, or rather of architectural decoration, is certainly to be found in the separate exhibition of the South Kensington Museum, which occupies a special room of the Art Gallery. There are here three life-size figures painted in oil, which were used as models for some mosaics executed in one of the halls at South Kensington, and which represent Michael Angelo, Apelles, and Donatello. The first is the work of the regretted Mr. Godfrey Sikes, the second of Mr. E. J. Poynter, and the third of Mr. R. Redgrave. These works by artists whose names are well known in France are very remarkable, and merit serious attention. By Mr. Sikes, in the same hall, we find in addition some pleasing architectural sketches; and by Mr. Poynter, a decoration — "The Months and Seasons" — in a very good style. The figures of May, July, September, and November, and of Spring and Winter, are excellent.

From Belgium, M. Louis de Curte, a pupil of the *Ecole des Beaux-Arts* at Paris, is the only exhibitor. He contributed a good design for a Gothic cathedral of the thirteenth century. The plan is very simple. At the intersection of the two branches of the cross, is a belfry resting upon eight pillars, and elegantly pierced by slender openings which let in the light, and produce the most charming effect. The towers of the façade are placed diagonally, which gives to the main entrance a certain originality. A general plan, a main façade, a side façade, and two sections, complete M. de Curte's contribution, which secured him a medal.

In the Italian section, M. Marianna exhibited a collection of about thirty drawings, representing a theatre for the city of Palermo. The plans of the substructure, of the stage, the green-room, etc., are on a scale of one-fiftieth, thus occupying a large surface. The auditorium is arranged with taste, as can be seen from some well-rendered sections and a general view. Unfortunately, I was unable to see the general plan, which had disappeared at the very moment I visited the Italian section.

Canada and New South Wales exhibited in their respective sections photographs of the principal monuments of their large cities. In general, these monuments have been built by English architects. The post-office at Sydney, and several buildings at Montreal, Quebec, and other cities, although not wanting in interest, would only furnish matter for monotonous descriptions, for no plans of these buildings were shown.

Spain, which occupied a separate little pavilion, had there concealed its architectural exhibition. This, however, did not prevent the committee from finding it out, and awarding three medals, — Don José Malde of Madrid, and Señor Antonio Rovira y Rabasa of Barcelona, for designs of commemorative monuments, and to Don Ramon Tenas of Barcelona, for a church. These drawings were well made and rendered, and merited the recognition accorded them.

Austria had sent photographs, both of monuments and of drawings. It would have been better, I think, to have sent the original drawings. In the first place, the photographic reductions are too small; and secondly, it is to be considered that an exhibition which is wholly made up of photographs is far from being attractive. Most of the works exhibited had been already displayed at the Vienna Exhibition of 1873; the works, at least, of those artists who obtained medals, — H. von Ferstel, Ludo Tischler, H. von Hansen, Fr. Schmidt. We cannot do better than to call attention to the criticisms already made public by M. Pascal (see the *Revue Générale de l'Architecture*, vol. xxxi. columns 22, 56, and 265), to the justice of which we can by personal observation testify. It is to be added that several monuments shown at Vienna by drawings are here shown by photographs of the buildings themselves. — M. C. PICTON, *in the Revue Générale de l'Architecture.*

CORRESPONDENCE.

WORK ON THE TUILERIES. — THE HÔTEL DE VILLE. — THE ELECTRIC LIGHT.

Paris, February.

"IT is an ill wind which blows nobody good," sums up many compensations in life which are unexpected, and architects may be pardoned if with the doctors and lawyers they count upon such ill winds for their chief practice. Certainly M. Lefuel, however patriotic, must regard the Commune with, to say the least, mingled feelings as he sees on the Rue de Rivoli the *pendant* to his earlier wing and Pavillon de Flore touching upon completion. The scaffolding about this building well illustrates how seriously all accessories of art and science are regarded here, for it is of a solidity which with us would be held sheer extravagance, and perhaps with reason. The pavilion, though receiving the finishing touches, is almost hidden behind its heavy stagings. At a distance, clear of all projections, are four massive stories of scaffolding, used only for communication and for raw materials, as between this and the walls are intermediate and movable stages on which the men work. Not a ladder is to be seen, but each façade has its stairway, three feet two inches in width, which reaches the story above in two runs of the easiest grade, and is protected with stout handrails. Children could play with safety over these stages and stairs. At the angles are huge elevators, nineteen feet square, for hoisting materials, supporting their own weight on four twenty-inch joists with braces in proportion. All this is bolted with iron bolts. Hardly a nail could be found, as all the secondary scaffolding is supported on spars lashed together, — a great economy where wood is high, as these spars are let out over and over again.

Naturally in private architecture these scaffoldings are less luxurious. After the ground floor is finished, the first thing is to erect an elevator of the ultimate height of the walls, and then spars fastened to the sidewalk in beds of mortar support the staging, and to these are lashed the successive stories. But in all cases there is a great deal more timber used than with us. The professor of construction at the *Ecole des Beaux-Arts* in his lectures pays a high compliment to the daring ingenuity of the American scaffolds. There is some excuse, however, for this solidity, as in France all mouldings and sculpture are cut when the stones are laid in place. Although the width of the staging protects the workmen in all weathers, huge sheds like giant marten-boxes are built out from and about the pediments and principal groups of sculpture. In these *ateliers*, working from the great plaster models, are gangs of men under the direction of distinguished sculptors, who themselves give the finishing touches. Among these are Cavelère, Lafrance, Bonnassieux, Bosio, etc.

A wide gap now separates the new pavilions above mentioned from ruins of the old garden façade of Philibert Delorme, and the uninitiated must be puzzled to see one end smoothly plastered, apparently to amuse men who pull themselves about on stages to draw figures. These are the "*appareilleurs*" who are working out full size diagrams of intersecting arches and vaults. They look like common workmen, but both from theoretical training and experience will do the most difficult problem faster than most professors.

Building under cover is taking a still greater development of late. About a year ago the frequenters of the boulevards were surprised to see rapidly put up on a vacant lot a prodigious wooden shed pierced with great windows and skylights. There was no getting a glimpse of the mysteries within, but during the winter months there came from it a ceaseless din of hammer and derrick; and one spring day the boarding vanished, and the street was agog with the sight of a noble five-story block entirely finished. The surprised divinities of the boulevard acknowledged with a shrug the beauty of the rival sprung Minerva-like upon them.

Speaking of the spars used, the Hôtel de Ville with its bristling scaffolding completely built far above the stone courses looks like a crowded seaport. Work on it is stopped, as there is a trial going on between contractors and architects. The latter have made many changes besides pulling down a large part built, and the former demand increased credits. At the new Hôtel Dieu now finished and in use, a whole story was taken down, as it was found the building was too high for the width between the ranges of wings; and even down there is much complaint at the air not circulating sufficiently through these spaces.

Each night of the Grand Opera, a crowd collects in the Place, and discusses the merits of the new electric lights. There are two clusters on the *perron*, and they suffice to turn the usually brilliant gas-lamps into mere points of dull yellow light, which bear about the same proportion to the intense white light diffused from the ground-glass lanterns that the oranges in a stall do to the street-lamp above. The central lanterns of the eight clusters in the square have been also fitted with it, and the Place is as bright as during a phenomenally bright moon. The experiment cannot yet be called successful, for the lights are so near the level of the eyes that nothing can be seen above or beyond them, the Opera only revealing itself in the gloom by a dull yellow glow from the *foyer*. However, the effect may be very fine when the light is placed as high as the cornices of the buildings, which in public monuments are always provided with a line of gas-jets.

M. Jamin, Professor of the *Sorbonne* and the *Ecole Polytechnique*, in a recent lecture gave an academic indorsement to this last industrial application of science; and aided by the inventor M. Jablochkoff, he showed how by condensers the divisibility of the electric light had been increased until a true means of canalizing the current had been obtained. He maintained that this light need not have the ghastly tone which has been the characteristic of previous electric lights, but that it really approached nearer to the sun's rays than any other light yet used. Those interested in gas have had a thorough fright, but he re-assured them somewhat by declaring that gas would retain its advantages for dwellings, but the electric light would be used with greater economy for lighting large spaces. It is being used and introduced in various large shops and establishments already.

There is to be, by the way, at the exhibition a complete display of light-houses and their apparatus, which in France are especially fine, as well as one of life-saving and wreck-helping tackle. This will be on the bank of the Seine, and form part of the Marine Exhibition, for which models are being expressly made. R.

THE CONNECTICUT SCHOOL OF DESIGN.—THE HARTFORD SOCIETY OF DECORATIVE ART.—THE CONNECTICUT MUSEUM OF INDUSTRIAL ART.

HARTFORD, CONN.

For many years past, efforts have been made in different parts of Connecticut, to establish schools of art work, where instruction should be given which would benefit the public interests of the State, and stimulate the desire for a better class of artistic products. The outgrowth of this feeling led to the formation of The Connecticut School of Design, which was opened in this city five or six years ago. The school held one or two annual exhibitions, which called forth a commendable show of oil-paintings and water-color drawings, together with some architectural work; but the association which had bravely entered upon its good labor, and had opened classes for gratuitous instruction in painting, was sadly crippled soon after its inception, by the departure from the city of a large proportion of its prominent members in the profession. Pecuniary embarrassments set in, and although the organization is still in existence, it takes now no active part in public education. The Hartford Society of Decorative Art is doing a good work in its particular line, which is chiefly the decoration of tiles, and drawing. The society aims to supply instruction in elemental drawing at a nominal cost; and its efforts have been thoroughly appreciated, as testified by the large attendance of scholars, who are under the instruction of Miss Tayler of Boston, a pupil of Hunt the artist. But the great opportunity for practical instruction in art is now offered at New Haven. The Connecticut Museum of Industrial Art has grown into existence principally through the efforts of Professor William P. Blake, and was established in 1876, the first public exhibition being held last year. As a nucleus to the property of the Museum, the Swedish figure-groups seen at the Centennial Exhibition were purchased, and under the direction of the Swedish Commissioner were placed in the old State House in New Haven, where last year a loan exhibition was held, which was this year repeated and attended with success, many rare and beautiful objects of art being shown to the public. The aim of the association is to promote the prosperity and artistic advancement of Connecticut industries, by the establishment of a museum containing specimens of the selected manufactures of the State, and of industrial and applied art generally. In connection with the Museum, schools for instruction in any branches of art from free-hand drawing to a knowledge of *repoussé* work are to be and have in part already been opened; the general plan of the organization being the same, on a reduced scale, as that of South Kensington. It is the endeavor of the managers that the Museum shall comprise not only the best specimens of Connecticut industries, but those from other sources; reproductions of works of art by means of casts and electrotypes, as well as materials illustrating the development of home industries up to the present time. It is proposed also to obtain a suitable library, which shall contain books, drawings, and photographs, having a direct bearing upon the application of art to industry and to general decoration. To further the instruction of teachers, lectures will be delivered by competent authorities in the various branches of art.

The Museum is, as its name indicates, a State association; its officers are chosen from the principal cities, and the management of the association is vested in a board of trustees, of which the Governor of the State, the Mayor of New Haven, and the President of Yale College, are *ex-officio* members. The city of New Haven has testified its interest in the movement, by an appropriation, by providing suitable rooms for the Museum, as well as by the generous response of individuals who have deposited in the collection many rare and antique articles, rendering the exhibition particularly attractive.

Some features of interest to the architectural student are seen in specimens of wrought-iron work from Messrs. Cox & Sons of London. One is a section of a *grille*, showing conventional foliated work, the effect being heightened by a judicious introduction of color upon different parts of the work. Among the Swedish terra-cotta work is a tall fluted column with carved cap and moulded base; and near by is a specimen of modelling of the human figure, something on the caryatid order. This terra-cotta work is of a grayish color like unbaked clay, while in the next room it is seen of another tint. A copy of the celebrated Warwick Vase shows the material in a light buff, and other examples of this shade are seen; notably a large vase, admirably executed and richly ornamented by clusters of flowers carved in the clay before baking. An architectural "boss" of Doulton ware is exhibited, and shows incised work as well as clearly-cut carving; the tints are subdued, being dark blue upon a drab ground. Some interesting specimens of Spanish tiles in a variety of colors, both glazed and unglazed, are to be seen.

The principal features of the loan exhibition are found on the upper floor of the State House, and in many respects the display may be favorably compared with the recent Loan Exhibition at the Academy of Design in New York. Rare specimens of porcelain are to be seen, Limoges faience, Dresden china, and Delft ware, as well as Japanese and Chinese curiosities, exquisite laces, and a creditable display of amateur decorative work. The schools are to be in several of the rooms on the ground floor. Already instruction is being given in making *macramé*-lace, and a class has been formed to study the decoration of pottery. Professor Honey of Yale College instructs pupils in mechanical drawing. Several of the leading manufacturers in the State have answered the call for specimens of their work, and others will soon be represented.

With these assurances of co-operation on the part of manufacturers, it is to be hoped that a general interest can be awakened throughout the State to consider the importance of sustaining an organization whose motives are to improve our present industries by a more rigorous application of the principles of art.

CHETWOOD.

HOW ST. JOHN IS REBUILDING.

ST. JOHN, N.B.

TO THE EDITOR OF THE AMERICAN ARCHITECT.

Dear Sir,—After our great fire which occurred, as you know, on the afternoon of Wednesday, the 20th of June last, the axe and saw of the carpenter were in great demand. Temporary wooden shanties sprung up everywhere, as if by magic; our public squares were soon covered with them; and some, built upon the ruins of more pretentious edifices, caught fire from the ashes still smouldering beneath. These shanties were of course inadequate to the requirements of their occupants: stores, dwellings, churches, public institutions, etc., must be provided, and for these the services of the architect were required. As the news of the calamity spread in all directions, many valiant knights of the T-square generously left their lucrative practices and honorable positions in other cities, and hastened to the rescue. For a while every steamer brought an addition to the ranks; and people soon learned to see without surprise the exterior of a fresh shanty gayly decorated with a dozen or more highly colored, unframed "perspectives" of panoramic proportions, a few indeed being faithful representations of meritorious work, but most seeming designed only to display utter contempt for all canons of good taste. Do I speak too plainly? Surely the men who by earnest endeavor and upright conduct adorn the profession of architecture know that this cap will not fit them.

Following the architects came the agents for the supply of building-material. The suspension by the Dominion Government, of duties on this class of merchandise at the Port of St. John, tended largely to increase our trade in such with the United States; and many new materials, formerly almost unknown among us, were introduced. Two of the most important of these were the enamelled bricks from Philadelphia, and mock stone-work made of galvanized sheet-iron. The former material attained at once a place in public favor; with the high finish and brilliant gloss of their polished surfaces, these bricks seemed a special gift of Providence, sent to occupy the place of freestone and granite, which were henceforth, by common consent, banished from the exterior of our buildings. Thousands of these bricks have been used,—in some cases with success; but where their brilliant colors have been most lavishly displayed the stripes and checks indulged in are altogether too suggestive of the Sioux Indians in the glory of their traditional war-paint.

The utter failure of granite and freestone to withstand intense heat opened the way for galvanized-iron work. This material had been used here before the fire, but sparingly; the cornices of most of our buildings having been of wood painted and sanded. The use of wood for such purposes being forbidden by law, the impossibility of forming heavy projections in brickwork leaves the sheet-metal master of the situation. Its apostles, for the enthusiasm of its votaries justifies the name, run into the wildest extravagance. But the greatest objection to the use of it is in the defective manner in which most (not all) of it is put up, owing to the urgency of the demand: large surfaces are covered with it, but precautions against contraction and expansion are seldom or never used; the joints are left open; the inside is never or rarely painted; so that in a few years repairs amounting to almost entire reconstruction will be necessary.

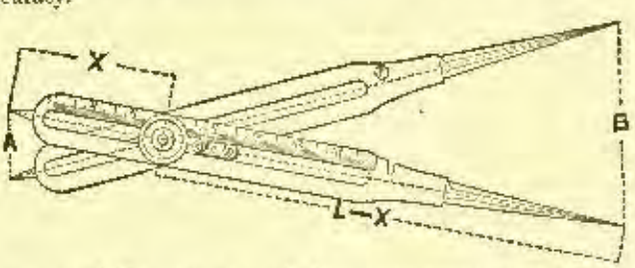
Of the contractors and mechanics who for a time have made our city their home, some of course are not so good as others; but a large number, I am happy to say, are good and trustworthy men, whose large experience and unquestioned integrity enables them to command the public confidence. The general workmanship of our buildings is at present much the same as formerly, good, bad, and indifferent; yet in the matter of brickwork all contractors seem to meet on a common level: it seems utterly impossible to convince the workmen of the importance of flushing back joints, or of the necessity of bond. As a rule, fronts are laid by a superior class of workmen; and amusing scenes frequently occur between the aristocratic layer of face-bricks, and his humbler brother of the side walls, when the former is obliged to accommodate the ends of his front to the twists which no amount of supervision can prevent the latter from imparting to his work. Some improvement has been made in regard to thickness of walls, by a law based upon the building-law of Boston, which took effect some three months after the fire; but, the majority of our principal business houses being previously under way, some extremely thin walls exist in the most important portion of our city, and some accidents have occurred, accounts of which have already appeared in your columns.

The weather throughout the winter has been exceptionally mild, so that there has been little interruption to building-operations. Most of the new stores are already occupied, and many dwellings of a much improved class will be ready for occupation by the 1st of May. Much work has been done, and much is talked of for the coming season; but competition is so active that prices will be kept at their lowest level. For a building worth about $9,000, offered in competition a short time ago, no less than twenty-two tenders were received. VENAX.

AN IMPROVEMENT IN PROPORTIONAL DIVIDERS.

IT is believed that this improvement, which can be easily added to any correctly made instrument, will render it of much more general application, especially in copying drawings when the unit of measure is to be changed, and will also afford a ready means of removing any incorrectness arising from breakage or wear of points.

As shown in the accompanying drawing, a scale of equal parts is graduated on one side of the instrument, its beginning being about half an inch from the extremity of the short joint. A vernier plate is fastened to the joint plate by two screws passing through slots, so as to allow the vernier plate to be moved either left or right, as the zero of the vernier must be set at exactly the same distance from the centre of the joint as from the extremity of the short point to the beginning of graduated scale. A vernier is graduated on this plate, to enable the instrument to be set with the necessary accuracy.



A scale of fifty parts to one inch is very convenient, and, the vernier being equal to nine of these parts divided in ten equal parts, differences of $\frac{1}{500}$ inch can be directly read upon the instrument.

To adjust the instrument, measure the exact total length of the instrument by a scale similar to that graduated upon it. Set the instrument by trial, so that the distance A between the short points shall have any desired ratio to B, between the long points. Calculate by the formula for lines the corresponding value of X or the reading for the instrument. Then loosening the vernier screws, slip the vernier on the plate, without moving the joint, until this reading is given by the graduated scale. Fix the screws, and the instrument is properly adjusted. Any change caused by breakage can be perfectly remedied by re-adjustment in the same manner.

GENERAL FORMULA.

Let L = total length of instrument, measured by the graduated scale.
X = distance from centre of joint to extremity of short points.
L — X = corresponding distance from the centre to the extremity of long points.
A = distance between the short points.
B = corresponding distance between the long points.

V = ratio of A to B = $\frac{B}{A}$.

From similar triangles we have,

A : B :: X : L — X, and, by substitution,

$X = \frac{L}{1+V}$, a general formula for setting the instrument.

N. B.— Whenever the value of X obtained from the following formulæ is too great to be set on the instrument, deduct it from L, set the vernier to this difference, and change the ends of the instrument.

1st, *Lines.*

$X = \frac{L}{1+V}$.

Set the instrument to read X. Take any distance A in points A, the distance between points B will = V × A.

2d, *Copying drawings, changing scales or units of measure.*

Let $\frac{1}{S}$ = actual scale of original, or fractional part of full size.

$\frac{1}{T}$ = actual scale of the required copy.

$X = \frac{L}{1+\frac{S}{T}}$.

Set the vernier to X. Take off dimensions of the original with points A, points B will give the corresponding dimensions of copy.

3d, *Length of any aliquot part of the circumference of a circle.*

Let n = number of equal parts into which the circumference is divided.

$X = \frac{L}{1+\frac{n}{2\pi}}$ Take a radius of the circle in points B, points A will give the length of arc required.

4th, *Side of regular inscribed polygon.*

n = number sides of polygon.

$X = \frac{L}{1+\frac{1}{2\sin\left(\frac{360^\circ}{2n}\right)}}$ Take radius in points B, points A give the length of the side of the polygon.

5th, *Side of a regular circumscribed polygon.*

n = number sides as before.

$X = \frac{L}{1+\frac{1}{2\tan\left(\frac{360^\circ}{2n}\right)}}$ Take a radius in points B, the points A give required side.

6th, *Similar surfaces or areas.*

Let V = ratio of area of given to that of proposed surface.

$X = \frac{L}{1+\sqrt{V}}$ Take any dimension of the given surface in points A, points B give the corresponding dimension of the proposed surface.

7th, *Similar solids or volumes.*

Let W = ratio of volume of given to that of proposed solid.

$X = \frac{L}{1+\sqrt[3]{W}}$ Take any dimension of the given solid in points A, points B will give the corresponding dimension of the required solid.

The values of X for the cases commonly occurring in practice may be calculated by the preceding formulæ, and tabulated once for all, thus allowing the instrument to be as quickly set as those most fully graduated, or those values may be calculated readily as required. Of course any shortening by breakage would change the value of L, and make a recalculation or correction of the tables necessary. N. C. R.

AN EXPLANATION FROM MR. BRABAZON.

WE have been prevented heretofore from taking due notice of a letter from Mr. Andrew Brabazon, the builder whose suit against the corporation of Trinity College was noticed in a letter from our Hartford correspondent of Feb. 16 (*American Architect*, No. 112). Mr. Brabazon encloses a communication from himself to the Hartford *Times* of Feb. 23, with a request that we should put him and Mr. Kimball in their proper places before our readers. We do not know that we can do more to put Mr. Brabazon in his proper place than to quote the essential part of his defence in the *Times*, which we give below. The decision of the court, which we must assume to be entitled to respect, awarded him $200 instead of the $1,500 which he claimed. The court therefore considered, it is to be inferred, that he had rendered services greater than it was reasonable to expect him to render without payment, and of less value than he considered them to be. Behind this decision we have no occasion or inclination to go. Mr. Brabazon says:—

"When Mr. Kimball got started on the new drawings he sent for me to figure on the cut stone, and told me he wanted a detailed price on every part, so that he could put on or leave off, as it suited the committee. I made up these bills for him, as he requested me to do. I gave the cost of the stock separate, and the value of the labor in itself; also the amount of both, given by the piece or foot, lineal, cube, or superficial, as it suited him. Then he wanted the total cost of each building summed up. In this way we figured up five buildings for him —namely, the students' dormitory, library, chapel, lecture-room, and dining-hall. After we got through with all the Ohio and upper stone trimmings, Mr. Kimball ordered us to go back and figure all the basement cut stone separate, which we did. After giving him all the information he desired, to help him to mature his drawings and finish them with a knowledge of their expense, and subject to his call from January to June, he also kept our time for twenty or thirty days."

SOOT-STAINED PLASTER.

AUSTIN, TEX.

EDITOR AMERICAN ARCHITECT.

Dear Sir, — On page 96 of your journal "a subscriber" asks for a remedy for "sulphur" which has appeared in plastering, caused by using old brick in the wall on which there was soot.

The cause of the color is probably the pyroligneous acid in the soot uniting with the calcite of the plaster, carrying with it enough carbon to give color.

There is no remedy except to remove the cause and effect, and re-plaster.

Respectfully, JOHN W. GLENN.

PITTSBURGH, PENN., March 20, 1878.

EDITORS OF AMERICAN ARCHITECT AND BUILDING NEWS.

Gentlemen, — Anent the query in your last issue as to "soot-stained plaster," I would remark that an experience of over thirty years in this sooty region has taught me that the only way to prevent such "stains" is to "cremate" all sooty

OLD BRICK.

A DAY IN BOSTON.

THE British tourist in America should by all means visit Boston. After seeing San Francisco, Chicago, and New York, he cannot help feeling well pleased with this city if he is interested in architecture, for it presents characteristics quite different from other cities in the United States. Situate on a peninsula, the ground rising to a hill in the centre, it has an advantage over other cities built on a dead level. The streets are irregular in plan, reminding one of our cathedral towns; and the buildings, though mostly all modern, and lacking the picturesqueness given by age, are yet grouped and arranged with good effect. The beautiful park with its shady walks, and the gardens with their fountains and statuary, are not miles distant from the centre of the city, as in some large

cities: in Boston they are in the midst of the city. Seated there, you have a view of many of the principal buildings, the gilded dome of the State House, the roofs of the houses near it, and the clock-towers of the city rise behind the foliage of the trees. There are no factory-chimneys, no noxious works to be seen: all looks clear and bright in the morning air. The streets, though not wide, are remarkably clean; in many old trees grow on each side; and, generally speaking, the footpaths are paved with red brick, with granite curb.

I was surprised to find the humblest class of dwellings built with brick, and faced with fine red pressed bricks, as good brickwork as I have seen in England. In all my ramble I did not see any inferior brickwork, very little cement, and, as a rule, an avoidance of wooden cornices and bay-windows. The ordinary dwellings are plain in character, the windows of good proportions. Some have bay windows curvilinear in plan, with a pier in the centre, and a window on each side. The doorways are recessed from the street, to give a sheltered porch, and the doors are in design an improvement on our four-panelled doors. In most cases the woodwork is not painted, — merely varnished or rubbed with oil. The cornices are of stone or brick, simple in design; and the uniform red brick-work is only relieved by the green-painted louvred shutters hung on the outside of the window, giving a not unpleasing effect. Some of the brick buildings (all the old buildings erected more than a century ago) are painted on the outside, which I think is quite a legitimate treatment when the brickwork is ugly or discolored. Many of the principal buildings are built of granite, others of freestone. One building in Post-Office Square, of Renaissance design, is built entirely of white marble. It has a clock-tower rising above a warm-colored roof, and altogether has a very rich effect. Although many of the chief buildings are of Italian or classic design, yet Gothic work seems highly in favor with the Bostonians, and there is evidence that they have drawn their inspiration of Gothic art from France. Some of the designs are excellent.

Trinity Church, the work of Mr. H. H. Richardson, architect, is well worthy of a visit. It is somewhat conspicuous, from the bright red color of the tiles on the tower roofs, which, doubtless, time will tone down. The church is cruciform in plan, with wide nave, the aisles narrow, used only as passages. The transepts are also wide, but not deep. The central tower, which is the chief feature, is built on four massive piers at the intersection of nave and transepts. The style, we are informed by the architect (in a published description of the church), is French Romanesque; to our thinking there is a touch of Florentine influence. A warm-colored freestone has been used for building; and the exterior, if not always graceful, is imposing and bold in detail; but the central tower, with its circular angle-turrets and pyramidal roof, seems to lack height. The interior of this church is very fine; the color is dark in key, a kind of Venetian red being the ground-work. The woodwork of the seats is of excellent design and color; the shafts of the tower-piers are of bronze color, with capitals and bases in gold; and the upper part of the tower is very rich and beautiful. There are some figure-subjects in bronze, which might have been better, as also the stained glass. A heavy chandelier of polished brass work is suspended from the centre of the tower, and the effect of the whole is very fine. The architectural forms are bold, and well suited for color.

Boston has an excellent Public Library, in a fine building of Italian design fronting the park. The collection of periodicals of all nations is said to be the most extensive in the country. There is also a collection of engravings, originally in the possession of Cardinal Tosti, well worthy of inspection. From an antiquarian point of view, Old South Church and the Old State House are interesting. Over the doorway of the church is a tablet giving the dates when the church was "gathered," built, destroyed, rebuilt, and desecrated by the British troops. On the whole, there is really much to admire in this city, which would well repay a longer visit. There is a quiet, orderly, unobtrusive feeling in its architecture, which seems to aim at building with good materials; at least there is not to the same extent that vulgar, ostentatious display characteristic of the architecture in many other cities. — *The Architect.*

NOTES AND CLIPPINGS.

The Statue of Liberty. — The *Dix-neuvième Siècle* speaks of M. Bartholdi's statue of Liberty as follows: —

"The plaster model is nearly completed. In a few days it will be stripped of the scaffolding which surrounds it, and upon which several gangs of men are at work. The first sentiment inspired by this enormous head, nearly thirty feet high, is almost terror. Its gigantic dimensions are stupefying; but by degrees the eye becomes accustomed to the colossal forms, and the mind reconciles itself to the extent of those great lines, and we discover in the midst of them the majesty and the light which the author has endeavored to give to the features. But the public will soon have an opportunity to see the beauty of this work, for the head of the statue of Liberty is to be exhibited at the Universal Exposition. M. Bartholdi is making copies in plaster of his statue of Liberty. Two hundred of them only will be executed, numbered and registered with the name of the purchaser."

Indian Pottery. — At Johnstown, R.I., a bed of soft soapstone has been uncovered, which proves to have been an old Indian pottery, where basins, pipe-bowls and axe-heads were made in immense quantities. The savages cut away the stone with pieces of slate till the shape of the proposed article, bottom-side up, was left detached on the ledge; it was then split off with wedges, and hollowed out with a sharp stone scoop or gouge.

Explosive Dust. — A correspondent of *Nature* writes: "There have been three explosions of malt-dust in our mill within four years, not due to any carelessness in allowing a flame to approach the impalpable dust, but ignited by a spark from a piece of flint passing through the steel rollers, or from excessive friction in some part of the wood fittings. Such explosions are not uncommon."

Second-Hand Loyalty. — There has always been a mystery as to the fate of decorations, such as triumphal arches, when they have served their purpose in this country. It seems that some, at least, of them, find their way to distant parts of the world, where they are again brought into requisition on festive occasions. For instance, the marriage of King Alfonso, of Spain, was celebrated the other day, with great pomp and rejoicing, at Havana. There was also an illumination of the Central Park; and one of the most striking features of the festivities was, it is stated, a triumphal arch, bought for $5,000 in England, which was used in this country on the return of the Prince of Wales from India, but which seemed none the worse for wear, and excited general admiration. — *Pall Mall Gazette.*

La Direction des Beaux-Arts at Paris. — M. Viollet-le-Duc, who, we suppose, is looked upon by Americans as the leading architect in France, although not wholly without honor in his own country, is yet looked on as rather an architectural black-sheep, so strong is the academic feeling in the graduates of the *École des Beaux-Arts*, who until very lately have been taught to look upon the architecture of the Middle Ages with scornful eyes. Because of his belief in and advocacy of what is usually known as Gothic architecture, he has failed of election to the academy, and although at one time appointed by the favor of the Emperor as a lecturer at the *École des Beaux-Arts*, he was obliged to desist from lecturing because of the outrageous conduct of the students and the opposition of the authorities of the school. The world, however, has been the gainer, in that the lectures he had prepared have been published as the well-known *Entretiens sur l'Architecture*. He has lately contradicted, in the following words, the report that he was a candidate for the office of Director of the Fine Arts: "I never have had a hankering after office, and the desire has not grown upon me with advancing age. Moreover, allow me to call attention to the fact that I have always enrolled myself in opposition to what is called the *direction* of the fine arts. If, as there is small likelihood, a minister should offer me this office, I would accept it for, perhaps, twenty-four hours, with the hope of demonstrating to him that the wisest thing he could do would be to suppress it."

Fires in Paris. — The official reports of the Paris Fire Department for 1877 show that there were 2,192 fires during the year, of which 1,707 resulted from negligence or imprudence, and 194 from accidents, three were set by incendiaries 178 are set down as arising from causes unknown, and 113 are ascribed to faulty construction. The total loss by these fires was $482,116, a sum that is often exceeded by the loss caused by a single fire in any of our cities. That so large a proportion as five per cent. of the number of fires should have been caused by faulty construction, shows that even good building and strict laws are not perfect guards against fires.

The Steam-Power of the World. — According to Dr. Engel, of Berlin, the aggregate steam motive-power at present in use in the world is 3,000,000 horse-power, employed in stationary engines, and 10,000,000 horse-power in locomotive engines, making a total of 13,000,000 horse-power. This force is maintained without the use of animal food, except by the miners who dig the coal and provide the fuel; and the force maintained in the muscles is to the force generated by the product, labor as about 1 to 1,000. This steam-power is equal to the working force of 25,000,000 horses, and one horse consumes three times as much food as one man. The steam-power therefore is equivalent to the saving of food for 75,000,000 human beings. Again, three power-looms, attended by one man, produce daily seventy-eight pieces of cotton fabric, against four pieces produced by one hand-loom, worked by one man, in the year 1800. This, of course, is but the merest outline of what is accomplished by the use of steam-power and labor-saving machinery.

Leaky Soil-Pipes. — One of the causes of leaks in cast-iron soil-pipes is that the shell is too thin; so that particles of the moulding-sand which, from the nature of a casting, must adhere to it to a greater or less extent, when they are jarred out or washed away leave behind them minute holes, which a slight oxidation renders practically impermeable to liquids, but not to gases.

Two Kinds of Architectural Description. — The following bits of architectural description found in the daily papers, are thoroughly American and well contrasted: —

"Michael Angelo's spirit is marching along. We have a depot. It has no lofty dome, no heaven-pointing spire, yet it reminds one of St. Peter's at Rome, — by way of contrast. It is not round, but it is just the ugliest thing yet invented in architecture. Come to Mount Healthy on the College Hill Railroad, and see what human can do in the hands of an artist. Like all good things, its real beauty consists in its utility; and as one of our poets says, it does nothing all to ——, especially on a rainy day."

"The Speaker [of the New York Assembly] will face the rising sun, flanked on either side by reporters' galleries raised the same height as the desk, but not standing out so prominently. Over his head will tower an ingenious Gothic arch, under which and stretching back above and beyond the Speaker's platform will be a commodious gallery for visitors."

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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BOSTON, APRIL 6, 1878.

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ENGLAND has just lost one of the two men who in common estimation stood first among her architects. As yet we hear by telegraph only that Sir Gilbert Scott died last week. He was perhaps the busiest architect in the profession. Born in 1811, he was grandson of the Rev. Thomas Scott, whose "Commentary on the Bible" was a household book a generation or two ago. His natural bent showed itself early, and it was his taste for studying and drawing old churches that led his father to set him to the study of architecture. The fondness for Gothic work thus early shown — or acquired — remained with him; it was only under constraint, apparently, that he designed in any other style. The Martyrs' Memorial at Oxford, a piece of Decorated Gothic, pretty closely studied from the crosses of Queen Eleanor, especially that at Waltham, and built in 1841, was his first conspicuous work, and was quickly followed by others. The next year he built the new church at Camberwell in London, and soon after was successful in a universal competition for the church of St. Nicholas at Hamburg, which was built from his designs — an extremely elaborate church in fourteenth century Gothic, which is said to have cost three quarters of a million of dollars, a great sum then in Germany. In 1855 he won again in a general competition for the new town hall at Hamburg; but his design, though accepted, was never carried out. He was also the architect of the cathedral at St. John's, Newfoundland, begun in 1848. At home he has done an immense amount of work, most conspicuously in restoring the cathedrals, the most of which, it would seem, with Westminster Abbey, have passed under his hand. He made great renovations, — which have brought mingled honor and reproach upon him, — at Ely, Lichfield, and Hereford; and at Salisbury, where he restored the chapter-house with great splendor. He remodelled the east end of Chester, and rebuilt, in conjunction with Mr. Slater, the great fallen tower and spire of Chichester. He built many country houses and other secular buildings, including the famous St. Pancras Station in London. When the new Foreign Offices in London were awarded, in competition, to comparatively inexperienced architects, a Parliamentary committee set aside the verdict and selected Scott, who was also employed with Sir Digby Wyatt on the India Office, and afterwards was the architect of the Home and Colonial Offices; — work which apparently brought him more kicks than pence from the government officials. He was one of the twelve architects chosen to compete for the new Law Courts in 1867, when Mr. Street was selected. He also built, for several of the colleges at Oxford and Cambridge, buildings of which the most successful is the chapel at Exeter College, Oxford, a manifest study from the *Sainte Chapelle* at Paris. At Glasgow he rebuilt the whole University Buildings. He was made an associate of the Royal Academy in 1852 and a fellow in 1860. He was subsequently knighted, in recompense, we believe, for his service as architect of the Albert Memorial at Kensington, for which he was chosen by the Queen. The Royal Gold Medal for Architecture was awarded him, in what year we do not remember. He was one of the founders of the Architectural Museum at Westminster; and an active member of the Royal Institute of British Architects, of which he was president from 1873 to 1876, being Mr. Barry's predecessor.

SIR GILBERT was a man of great activity of mind, and apparently of great tact and practical sagacity. He was warmly interested in everything that belonged to his profession, a learned archæologist, and contributed many papers to the proceedings of the Institute, writing also several treatises for publication, — among them "Gleanings from Westminster Abbey," and some papers on restorations. He was a thorough-paced Gothicist, although when the Foreign Offices were given him, Lord Palmerston, then premier, obliged him to change his design and build in Renaissance. His preference in English Gothic seems to have been for Decorated work, if we may judge by his designs; but he was somewhat given to eclecticism, with a stronger bias toward French detail than most of his countrymen. The amount of work he undertook was prodigious, — probably much greater than he could do full justice to. His multifarious restorations habituated him to a great regard for precedent, and while they were carried to a degree that brought him much reproach from the opponents of restoration, they were executed with a careful regard for authentic style. A chief characteristic of his design was its elaborate refinement and exuberance in detail; he was stronger in this than in composition and outline. Among his most characteristic works are the screens and inner decorations which he designed for the cathedrals he restored and the churches he built; we may mention especially the metal screens in Ely and Hereford, which are marvels of elaborate design and workmanship. Perhaps the chapel of Exeter College shows him to as good advantage as anything he did. Some of his fellows, Street for instance, (who was his pupil), and Burges, have shown a truer instinct for the mediæval, and especially the English style, in which they work. In fact, we can fancy that Scott, in spite of his predilections, retained to the last a trace of influence of the classic training to which he was compelled at the beginning of his studies. It seems to crop out here and there in his work, as it did in the Gothic of Italy. When he took leave of the conventional types of building he was apt to fail in the disposition of his design, and fall into a baldness of outline that was essentially un-Gothic. The willfulness and spontaneity of true Gothic were apparently not in him. His designs for the Law Courts were Italian rather than English. They included an attempt to ally the round dome with the pointed arch, and showed a feeling for squareness and absolute symmetry of disposition, and for horizontal lines rather than vertical, which reappears elsewhere in his work. The Albert Memorial, a great Italian canopy sixty feet high, gaunt and meagre in outline, but absolutely incrusted with minute detail elaborated to the last degree of refinement, shows the strength and weakness of his work as well as any of his buildings that we can recall.

A CORRESPONDENT of the Philadelphia *Daily Telegraph*, writing from Washington about the Corcoran Gallery there, is moved by the unfortunate Carpenter picture just hung in the Capitol, and the painting by Brumidi which is still going on, to urge the importance of missionary work in art at Washington. The question of art at the capital is certainly a difficult one. The enterprises of Congress in the direction of art have been persistently unhappy, and the last state is at least no better than the first. We dare say that all the *Telegraph's* dispraise of Brumidi's present doings in the rotunda is deserved. The radical difficulty is that the patronage of art is in the wrong hands, or perhaps that the right hands are not to be found. The men who wield the patronage have been appointed for entirely different duties. It is no affront to men who are chosen for purely political reasons to say that they are not likely to be qualified as patrons of art; and that so long as their disposition to immediate control of all details leads them to act as patrons, they will probably succeed as well as a parish meeting or a caucus would, and no better. There being no provision in the government for the administration of matters of art, they are dealt with in the same rough manner, but with not so much understanding, as the political matters to which our legislators are more used. Under these circumstances it is perhaps as well that the government should have no more to do with them than is really necessary. Art is a thing so exacting of special preparation, and so apart in its quality from the ordinary concerns of life, that a government in whose theory there is no recognition of it may very reasonably decide to let it alone. The only safe al-

ternative seems to be the appointment of special officers whose duty it should be to advise the government and shape its action in questions of art; but we see no indication that the country is ripe for this.

It is a mistake to assume that the traditional functions of a capital city, as a centre of the activity of a nation in all its important concerns, are fulfilled in Washington. It is doubtful if they will ever be, unless the character of our government changes considerably; nor are they, except by accidental coincidence, in the state capitals. The purely political constitution of our government, the short terms and the character of its officers, who are all chosen and changed for political reasons make Washington simply a political capital. There is even a common disposition to argue that state and national capitals ought to be removed from the great cities, in order to seclude their political work from the interference of other interests. It is true that the houses of Congress, partly from solicitation of individual axe-grinders, partly from a natural desire to control everything, are apt to put their hands to all kinds of work; but it is merely by the application of political gauges and political methods to outside concerns. Moreover, the character of our politics makes the people of Washington essentially an average community. There is no conflux of commanding ability, still less of special acquirement and cultivation. There is even a noticeable jealousy — common nowadays among average men, and perhaps not altogether unwarranted — of the claims of superior cultivation, as of something arrogant and domineering, and a disposition to flout it. It is true that legislators and rotating office holders do not make up the whole community at Washington. The permanent branches of the public service and the diplomatic corps bring a good many men of superior acquirement, but these are an element apart. Not only the administration of the government and the city, but the tone of the place, is given by the political element, and against this it is not of much use to contend at its focus.

On the whole, we are disposed to doubt if Washington is a fruitful missionary ground for art. Its continually changing population, the engrossment of everybody in other affairs, and the migratory feeling that takes possession of everybody, are hostile to any real interest in art. The people who come there are what they have grown to be at home, and are likely to remain so till they return. They have no leisure to cultivate themselves there. Whatever thought they give to anything outside their political business is only to be had by demanding it; and artists who clamor for attention are not the kind that advance their art. Therefore, making all due allowance for the stable element in the population, and a fair average interest among the shifting part, we should not expect that Washington would ever become a city favored in art. We could not think of a place where a school for art would be more thrown away, or where museums and other such appliances would bear less fruit. As the capital of the nation, claiming to be a city of the first rank, where wealth and fashion congregate every year, it should naturally be embellished, and it will be. The taste with which it is embellished will depend on the judgment of individuals who, like Mr. Corcoran, are generous enough to give their money and care in such ways as there is opportunity for, and upon that discretion of legislatures which has already adorned it with the works of Mills, Vinnie Ream, and Carpenter; to expect that it will come to be a city of high artistic influence in the country is, we fear, to invite disappointment.

The people of Philadelphia are awakening, not too soon, to the need of arranging a proper system of sewage in a city so large as theirs. At present there is, as in most cities, no system but different parts of the city are drained independently and some not at all. The old-fashioned way not yet abandoned, was to drain the soil-pipes into a cesspool, and let the sink waste run over into the street gutters. The cesspools were sometimes in the yard and sometimes under the houses. They were of brick laid dry, allowing the liquid from the soil-pipes to soak away and saturate the ground in the yards and cellars. Where there are sewers they are of brick, and therefore porous like the cesspools. Most commonly they only receive the overflow from these and the water of the drains. The question of building some new sewers has brought out a controversy, such as could hardly exist in most places, between advocates of the old habit of building brick sewers and those of the modern system of pipes. The Councils have before them now a memorial from a body of physicians requesting the appointment of a commission to examine and report upon the methods in use in the other large cities in the United States and in Europe. It is encouraging to be told, meanwhile, that the danger to the piling of the Back Bay district in Boston from lowering the ground-water by the proposed new sewers is less than was feared. The dread was that the water in the ground, finding its way into the sewers laid below tide water, would leave the piles dry, and that they would decay. (See *American Architect*, Nos. 104, 105.) Experiments have been tried for several weeks successively to see if there could be infiltration enough into the sewers to perceptibly reduce the moisture in the ground. Continuous pumping of the sewer in Berkeley Street has failed to produce any considerable effect on the level of the water in the ground close at hand. The Sewerage Commission has concluded that its expectation was not justified, and that the effect in this way of the new sewers must be very slight, not enough at all events to injure any houses but a few of those which were first built, where the piles were cut off above grade five, — the height afterwards fixed by the building law.

The Metropolitan Board of Works in London has never been renowned for gentle dealing; but a story told of it in the *British Architect* rather outlooks what we have heard of it before, and shows an enforcement of personal responsibility which would look strange on this side of the water. The Rev. Dr. Lee is incumbent of All Saints, a poor parish in Lambeth, in the south of London. The church having fallen into dilapidation and the parish being too poor to provide money to put it in order, the incumbent spent some four or five thousand dollars of his own in repairing it, and then, finding that he could spare no more money, his income being small, declined to do more. A part of the tower fell down, and the Board of Works, under the law which allows them to repair an insecure building at the expense of its owner, repaired the tower at the cost of five hundred dollars, and summoned Dr. Lee, as the constructive owner of the church, to pay for it. This the incumbent refused to do, and the Board applied to a magistrate for a distress warrant against his private property. That being refused by the magistrate, on the ground that the act of Parliament did not intend such severity, the Board threatened the magistrate with a writ of *mandamus* to compel him to issue the warrant, and there at the last account the matter stood. Under the law the Board had the alternative of selling the church, but, being asked by the magistrate why it did not do this, declined to do it on the ground that it would be useless, since there was no one to buy.

If our readers notice anything unfamiliar in the aspect of our paper to-day, they may ascribe it to the fact that the change in its publishing house, which has already been made known, has brought with it a change in the printing-house, and that the *American Architect* is henceforth to be printed at the Riverside Press.

SCHLIEMANN'S MYCENÆ.[1]

I.

Dr. Schliemann's discoveries have probably attracted more universal interest than any other archæological discoveries of the day. This interest is twofold: literary and historical, in that it connects itself directly with the exegesis of the greatest of classic poets, of the early traditions of Greece, and of the plays of the Attic dramatists; archæological, as it bears on the study of ancient art. Into the historical discussion we shall not presume to intrude. The unlearned must be satisfied to remember that there is no record, in history or tradition, of more than one era at which Mycenæ was powerful enough to justify either the sounding praises of Homer or the splendors discovered by Dr. Schliemann. Whatever its power once was, — and its ruins have borne witness of its power since the days of Pausanias, — it was broken at the time of the Dorian invasion, near the beginning of the eleventh century B. C., and it never was reëstablished. At the time of the Persian war Mycenæ was only strong enough

[1] Mycenæ: A Narrative of Researches and Discoveries at Mycenæ and Tiryns. By Dr. Henry Schliemann, citizen of the United States of America. Author of "Troy and its Remains," "Ithaque, le Péloponnèse, et Troie," and "La Chine et le Japon." The Preface by the Right Hon. W. E. Gladstone, D. C. L. Maps, Plans, and other Illustrations, representing more than 700 types of the objects found in the Royal Sepulchres of Mycenæ and elsewhere in the Excavations. New York: Scribner, Armstrong, & Co. 1878.

to send eighty men to Thermopylæ, and four hundred to Platæa. Very soon after, it was overthrown by the jealousy of the neighboring city of Argos, and from that time has been known — when not absolutely forgotten — only by its ruins. If it ever had a race of splendid kings, they must have lived in the dim prehistoric time to which Homer's poems are believed to refer; that it had such, the prodigal display of treasure in the tombs which Dr. Schliemann has laid open would have led us to believe, if the Homeric poems had said nothing about them. When it comes to the identification of individuals and the corroboration of particular events, the questions that arise are difficult and complicated, and we may leave them to the learned. Two or three points will, however, suggest themselves to a careful reader: that it is contrary to all analogy that such a series of legends as are embodied in the Homeric poems and the Athenian tragedies should have become established without a basis of facts; that it is the tendency of tradition to group a variety of incidents about a few names chosen by natural selection; and that a historical *mise en scène* is an entirely modern idea, in other words, that as far as manners and customs go any early legend will reflect the characteristics of those by whom it was recorded rather than of those whom it describes, as the legends of the Arthurian cycles depict the ideas and habits of the twelfth century rather than the days of Briton kings; and although in primeval times manners altered slowly, so that generations made less change than years do now, and therefore the record might not very rapidly diverge from its prototype, the process of adjustment to changing ideas would not end until the legends received their permanent form. Many curious correspondences are found between the Mycenæan discoveries and things described by Homer, and there also is a plenty of discrepancies, but for these the reader is referred to the book itself, and to the ingenious but perhaps not always discriminating preface of Mr. Gladstone.

To our knowledge of the architecture of Mycenæ Dr. Schliemann does not add very much, his interest being mainly concentrated on other things. His illustrations of the masonry found in the walls of the acropolis are substantially the same as those given by earlier examiners, showing the three kinds of so-called Cyclopæan work, — the irregular rubble pinned up with small stones, the close-jointed polygonal work and the coursed rubble, all which he thinks are more likely to have been in use simultaneously than successively. In spite of considerable embarrassment from the Archæological Society at Athens, which insisted on his waiting till they should strengthen some of the adjoining walls, but apparently never did it, he succeeded in laying bare the threshold of the famous Lions' Gate. The opening, when exposed, proved to be of peculiar form, being nearly square, 10 feet 8 in. high, 10 feet 3 in. wide at the bottom, and 9 feet 6 in. at the top. The threshold is a block of hard breccia, like the adjoining masonry, and contained two holes of quadrantal plan at the feet of the rebates in the jambs, as if to receive bronze plates for the pintles of the doors; in the middle is a rectangular hole for the bolt. The jambs as well as the threshold are deep enough to receive the folds of the gates when swung back inward, and in each jamb are two oval slots near the inner edge, where it is difficult to assign them a use, and a square hole close against the rebate, as if to receive a bar. The threshold is furrowed longitudinally, as if to keep horses' feet from slipping on it, and is crossed by two or three channels, which Dr. Schliemann thinks must have been cut to carry off the water, which would have run down from the rising ground of the acropolis within, though they would seem to be both unnecessary and inadequate for this use. But he entirely rejects as travellers' inventions the ruts of chariot wheels which he finds ascribed to it in "all guide books." He can not discover them in the water channels that he represents, and the threshold itself, he thinks, "no mortal eye can have seen for more than 2300 years." It is curious, then, that they should have got into the guide books. The threshold is a huge block of stone, fifteen feet long and eight wide, and apparently three and a half high (the scale attached to the plan is figured wrongly), having on its outer face a curious large cuneiform cutting, of which Dr. Schliemann says the counterpart is to be found in the large flat stone in the middle of the gate at Troy. Unless the threshold was exposed so as to be inordinately high, this mark must have been almost covered by the soil or the pavement outside. If it was uncovered, there was certainly no chance for chariots to enter at the gate. Dr. Schliemann says nothing of any pavement, nor of any effort to discover the level of the roadway within the gate or without. About the famous lions above the gate he has a new suggestion. Their heads, he says, are not simply broken off, as is commonly taken for granted, for they were not cut from one stone with the bodies, but dowelled on, as is shown by the straight joints and holes at the necks. He makes the suggestion, which is not unlikely, that they were of bronze.

In one part of the walls themselves, and in several places in the enormous walls of the neighboring city of Tiryns, which Dr. Schliemann first examined, he found longitudinal galleries in the thickness of the walls. The galleries were of triangular or rudely arched section, the overlapping courses of masonry meeting in a line overhead. In one of them, at Tiryns, was a series of triangular openings in the outside wall, built in the same way, which he imagined to have been loopholes, or rather windows, for the archers that defended it. They must have been rather exposing, however, for they reach to the floor of the gallery, which is the surface of the rock on the edge of the cliff, and are apparently as high as a man.

The most interesting structures at Mycenæ are the well-known domical subterraneous buildings. It has been the custom, following the lead of Pausanias, to call them treasuries, though some archæologists have argued strenuously that they must be tombs, and others, plausibly enough, that they may have been both. Of these Dr. Schliemann's plan shows five, and the one nearest the gate tempted Mrs. Schliemann to excavate it, being apparently the only one, except the so-called "treasury of Atreus," which remains in tolerable preservation. It was circular in plan, like all the rest, and essentially like that of Atreus in construction, being built of overlapping horizontal courses, but rather more rudely, and perhaps earlier. If the section given in the book is drawn with accuracy, this building is simply conical, whereas in the treasury of Atreus the inner face of the wall is dressed to a well-wrought curve, said by Professor Donaldson, somewhat vaguely, to be "a species of parabolic curve."[1] It is entered through the same sort of roofed passage, or *dromos*, as the other, the entrance fronting down-hill in both buildings, as is natural in subterranean structures, but is smaller, being apparently only thirty feet in diameter inside. It has the same square-headed door-way, of almost identical dimensions, 8 ft. 1 in. wide by 18 ft. 5 in. high, covered in the same way with a lintel which is relieved by a triangular opening above. The jambs and lintel do not seem to have been dressed like those of the treasury of Atreus, where two broad sinkages are carried around the whole opening, but the lintel, which is thin, has a projecting band that still shows traces of a scalloped ornament in plain semicircles. Although the outer face of the door-way does not give the same indications as in the other building of having been faced with applied stone or other material, Dr. Schliemann thinks he saw proof that there had been an attached column on each side of the door-way, after the manner of Professor Donaldson's ingenious restoration of the Atreus treasury, and found outside a fragment of one of them, 4 ft. 3 in. high, of one foot 4 in. diameter, and fluted, of which it is to be regretted that he gave no illustration. He does not say of what material it is; but two decorated fragments which were found, one of white and one of blue marble, would seem to indicate that this building as well as the other had a decoration, probably an entrance façade, of polychrome design. The carved ornament on these is very like that on the pieces found at the door of the treasury of Atreus. One of them has a series of discs in low relief, with two lines of herring-bone ornament above it. Another is decorated with the compact continuous spiral or running scroll, like the Greek wave ornament or so-called Vitruvian scroll, which characterizes the ornament of the Atreus treasury; and this, since it is found on two adjacent sides, suggests that the block must have been applied to a jamb or a lintel. With these one is tempted to associate the fragment of red porphyry represented on page 97, carved with ornaments which Dr. Schliemann calls palmettos, and which might suggest either an Egyptian or an Assyrian relationship. As far as we can infer from the not very precise statement in the book, this fragment was found inside the wall of the acropolis, but it is entirely unlike anything else in the book, while it is very closely analogous to a fragment found in the other treasury, which is not included in Professor Donaldson's restoration, but is accessible to most readers in Gailhabaud's "Monuments." Nevertheless it is to be noticed that the porphyry fragment shown in Schliemann's book appears inferior in execution to the other pieces found in his treasury. The interior of this treasury does not show, like its neighbor, the holes and the bronze nails by which the bronze

[1] Most of our readers will not need to be reminded that there is but one form of parabolic curve, all parabolas being exactly alike except in size, like all circles.

plates which lined it are supposed to have been fastened, but a piece of such a plate was found so firmly jammed in the joint between two of the stones that it could not be pulled out. Embarrassing interference of the Archæological Society troubled the work here too, and only allowed the floor to be cleared in the middle, leaving a bank from seven to ten feet high against the wall. This may possibly, though not probably, have prevented Dr. Schliemann from seeing whether there was an inner excavated chamber attached to the principal structure, as to the treasury of Atreus,[1] a very important question of which he says nothing in his book, but which we can hardly suppose he forgot to consider.

The excavations made within the acropolis walls, where the most remarkable discoveries were made, were of a much simpler kind, in one way, than the previous ones at Hissarlik in search of the site of Troy; for although in the superficial earth there were fragments of pottery of a later date, all the important remains were substantially of one stratum and one date, with the possible exception of the tombstones found above the sepulchres, to which we shall refer later. Once inside the walls, Dr. Schliemann soon came upon a series of walls of Cyclopæan masonry, inclosing rooms of various sizes and shapes, and since there are no openings in these walls he naturally inferred that they were but foundation-walls, and that here as at Troy the superstructures must have been of wood. A little farther from the gate he came upon an inner wall, running parallel to the outer which here makes a sweep toward the south, roughly laid as if to serve as a retaining wall to level up the ground, which ascended from the gate. It was covered by a double row of upright slabs which seemed likely to be part of a complete circle. Here was the clue to the subsequent discoveries, for, uncovering the circle, he traced its whole circumference and found that the double row of slabs had inclosed it. The two rows had been continuous and concentric, standing about three feet apart, and inclining toward the centre of the circle, and were connected by a covering of flat stones, of which some remained in place, neatly fitted with tenons and mortises which held them in position. The slabs rose some four or five feet from the ground; but the earth within the circle had been levelled and raised, so that men might sit, and doubtless did sit, on this circular stone bench, in a ring of a hundred feet in diameter, as spectators of what went on within it. Here, then, Dr. Schliemann justifiably concluded, was the famous Agora of Mycenæ, the place of meeting of the elders, celebrated by Euripides; and the adjacent houses, he decided, must naturally be the royal palace, — the palace of Atreus and Agamemnon, the scene of the crime of Clytemnestra and Ægisthus and of the vengeance of Orestes.

Excavating within this circle, among a great accumulation of vases and fragments of pottery, figures of animals and rude images which he calls idols, swords and ornaments of bronze, bone, stone, and terra cotta, Dr. Schliemann found, at a depth of ten or twelve feet below the surface, four tombstones which stood or had stood upright, and fragments of others, carved with figures of men and horses, and with ornaments analogous to those on the marbles found in the treasuries, but, if we may judge by the illustrations, of incomparably ruder execution. At a lower level he found other and curious slabs in positions that suggested a sepulchral use, and in one place a remarkable oval structure, like a well-curb filled up, seven feet long and four high, which he took to be a funeral altar. Finally, still lower down, from twenty-five to thirty feet below the surface, he reached, one after another, five great sepulchres, burial pits sunk some feet into the rock, the largest eighteen feet wide and twenty-four long, lined with battered walls of rough stone. Of the contents of them, the important part of Dr. Schliemann's discoveries, we must speak in another article. They contained in all remains of fifteen human bodies, and an amount of treasure in gold which has been valued at twenty-five thousand dollars.

[1] A correspondent of the *Boston Daily Advertiser*, writing from Mycenæ a month ago, makes the astonishing statement that this inner chamber cut in the rock, which has just been cleared in the course of the excavations now going on, which has been shown as rectangular by all the authorities, and of which the measurements have been given with great precision, *is really round*.

Good Wholesome Earth.—The suit of Charles G. Waterbury, against the city of New York, now before the Supreme Court, is on a contract for filling in with good wholesome earth a portion of First Avenue which runs through a swamp. The city's witnesses testified during the case that in various openings in the "good, wholesome earth," made for sewerage, testing, etc., they found jute, brown corn, rags, wire, crockery, shoes, bones, glass, and earthenware. We are not surprised to learn that Wm. M. Tweed was called to testify that the contract was fraudulent in its inception.

THE RESTORATIONS AT GOSLAR.[2]

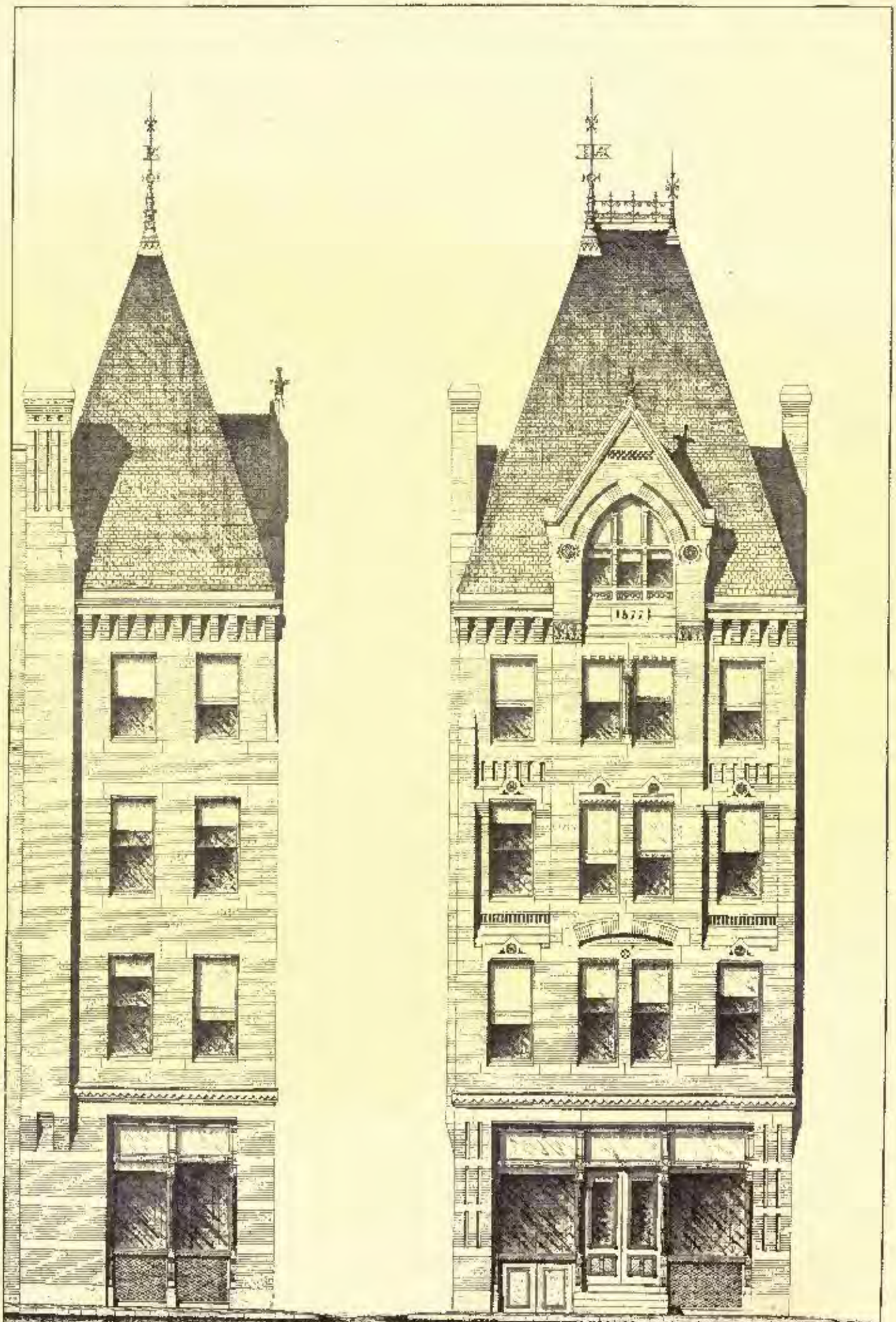
Since the restoration of the Wartburg[3] no more important architectural work has been undertaken in Germany than the rehabilitation of the imperial palace at Goslar. Perhaps, indeed, when we consider the nature of the building, it will not seem necessary to limit my statement to Germany. The restorer's aid has in all countries been principally afforded to ecclesiastical structures. Here, owing to the number of more or less perfect contemporary models, his work, however locally important, is less difficult, and even the most successful result must be less instructive than if he had been employed on the restoration of a great civil building. Such buildings of the eleventh and twelfth centuries do not exist except in a state of ruin. Little remains to give the art-student a picture of the interior of a Romanesque building; nothing to give the German people in general as true an idea of the surroundings amid which their ancestors lived, as they can easily gain of these amid which they worshipped. So when the question as to how the ruinous Wartburg should be treated was first started, it is easy to see why the method ultimately chosen was the most desirable. The choice lay, as ever, between the two rival methods of conservation and restoration. The former contents itself with clearing away every probable accretion of more recent times, and taking every possible precaution for the preservation of what may remain of primitive work. The other method, — to restore the relics under our hands according to the testimony of historical record, of literary illustration, and of æsthetic analogy to as nearly as may be the appearance they were when fresh from the fingers of architect and decorator, — was the method applied to the Wartburg. It may be a question, whether the complete restoration of a Romanesque church that had fallen into such decay as had overtaken the Wartburg, would have been a laudable, much less a necessary, work. Enough remains of ecclesiastical architecture of that period to give the most careless student a fair idea of its character and æsthetic value. What might remain of old work in such a ruinous example would be more valuable than the pseudo-perfection of a restoration. But, as I have said, no building remains sufficiently perfect to give a fair idea of the civil architecture of the time, or to characterize the mode of life and thought of Romanesque builders. Difficult as it was by a minutely careful scrutiny of existing monuments to gather sufficient data for the work of restoration, yet the most intemperate advocate of simple conservation can hardly fail to find the result satisfactory, and must at all events approve of the scrupulous archæological judgment with which the work was done. All students who have seen the Wartburg are far better able, even if some of the details are presumably rather than demonstrably correct, to conceive in their perfection and appreciate in their ruin the numberless remains of Romanesque dwellings scattered throughout Europe, than they would be if its restoration had been confined to conservation. Whatever original work may be covered by or lost amid modern work is amply atoned for by the increased legibility and value of every contemporary ground-plan and chisel-stroke in Europe.

When it came to be a question of restoring the great imperial palace at Goslar, things stood differently. The Wartburg was ready to serve as interpreter, — should not Goslar be purified and preserved, but left untouched by the restorer? A decision either way, had such decision been conscientiously carried out, would have met with approval from all impartial observers. But it must be universally deplored that neither of the two courses indicated above was chosen, but a course that has made out of the once superb residence, noble even in its ruin, a monster neither old nor new, a lie, as has been said in Germany, against which every tourist, every art-student, every German ought to be strenuously warned. The Wartburg was the stronghold of romantic and legendary Germany. Goslar, one of the most important centres of historical and heroic Germany. Against the beautiful and reverent treatment of the one, we have to set the desecration and transformation of the other. The Franconian emperors were nearer to us in the half-ruined corn-magazine of twenty years ago than they can ever be in the travestied and modernized palace of to-day.

The old "burg" of Goslar needed enlargement, we find, as early as the year 925, but the celebrated royal residence and chapel were not founded till 1036, becoming the favorite residence of their builder, Henry III., and his son, Henry IV. The city was sacked and the buildings much damaged by Henry, the Lion, in 1180, and it was very probably then that the palace fell from an imperial residence proper to become the residence of imperial delegates. Later it was ceded to the city, and has been used in succession as court-house, arsenal and armory, Jesuit college, prison, hospital, theatre, and grain depot; and in parts for still other purposes. It will be imagined that the work of restoration was likely to be both necessary and difficult. First determined upon by the last king of Han-

[2] The following details of the work in progress at Goslar have been in great part drawn from different numbers of the *Weser-Zeitung*, Bremen.

[3] The Wartburg, a castle near Eisenach, long the residence of the Margraves of Thuringia, was built about the year 1070. The name may have been derived from an exulting cry of its founder, Ludwig der Springer, to the cliff which towered over his little town: "*Ward' Berg, Du sollst mir ein Wart-Burg werden.*" Within its walls lived Saint Elizabeth, the Margravine, and in later times the heretic Luther found a refuge; here is still shown the stain left by his ink-stand flung at the Devil. It has since been remarked that the choice of a weapon was wise: nothing is so hateful to that Evil One as Ink. Here also was the contest of the Minnesingers, and in our own century the seditious meetings of students from every University of the newly awakened Germany. The restoration of this castle referred to in the text has excited a national interest. C.



HARKNESS COURT FRONT.

Walker & Gould Archts.

BUILDING FOR N.W. ALDRICH, PROVIDENCE, R. I.

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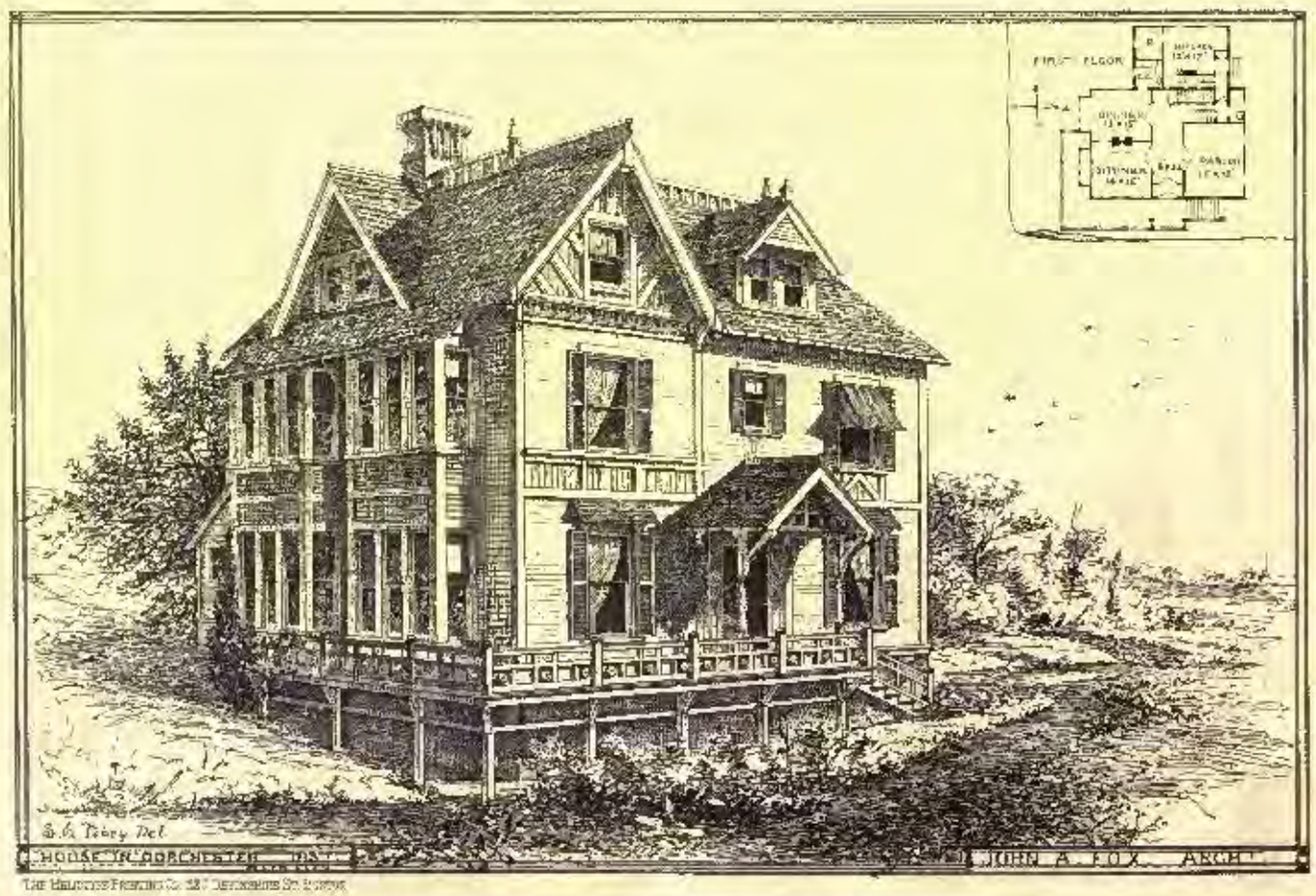

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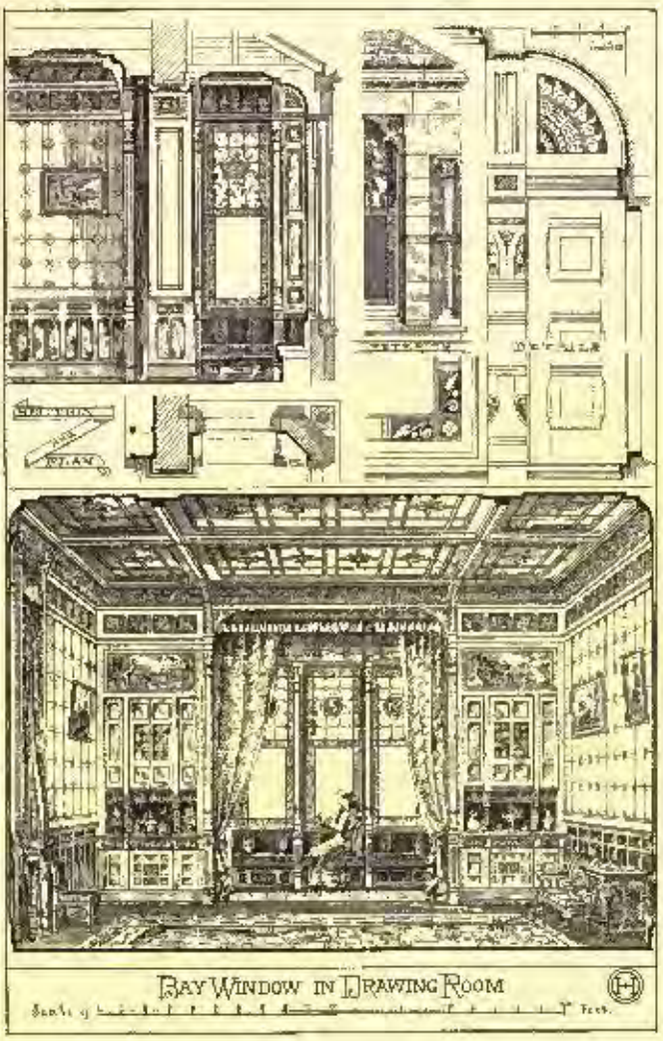
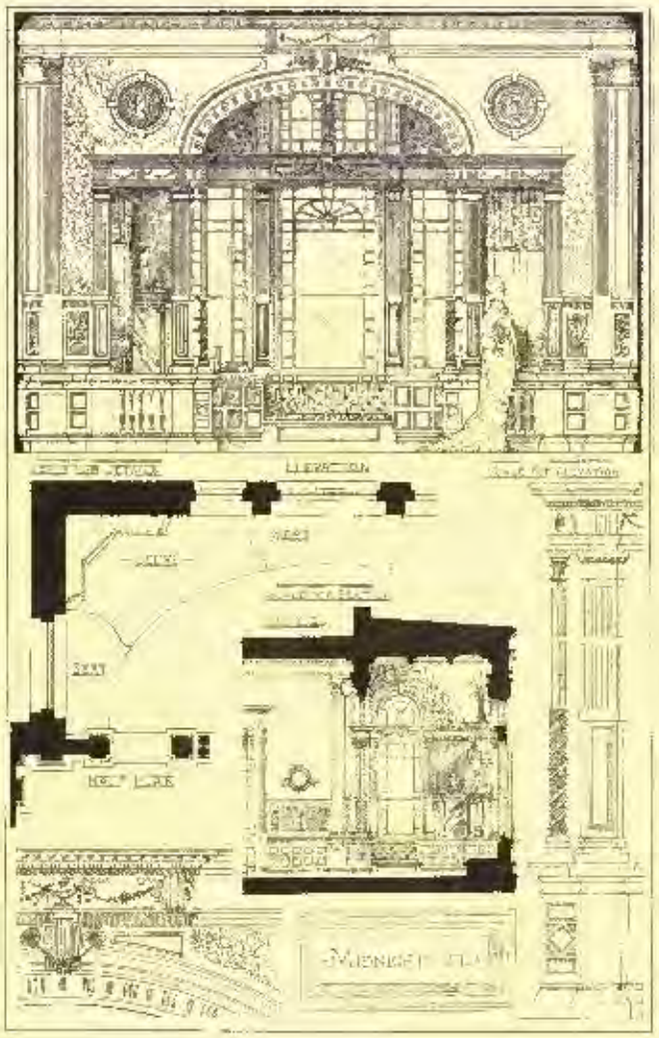
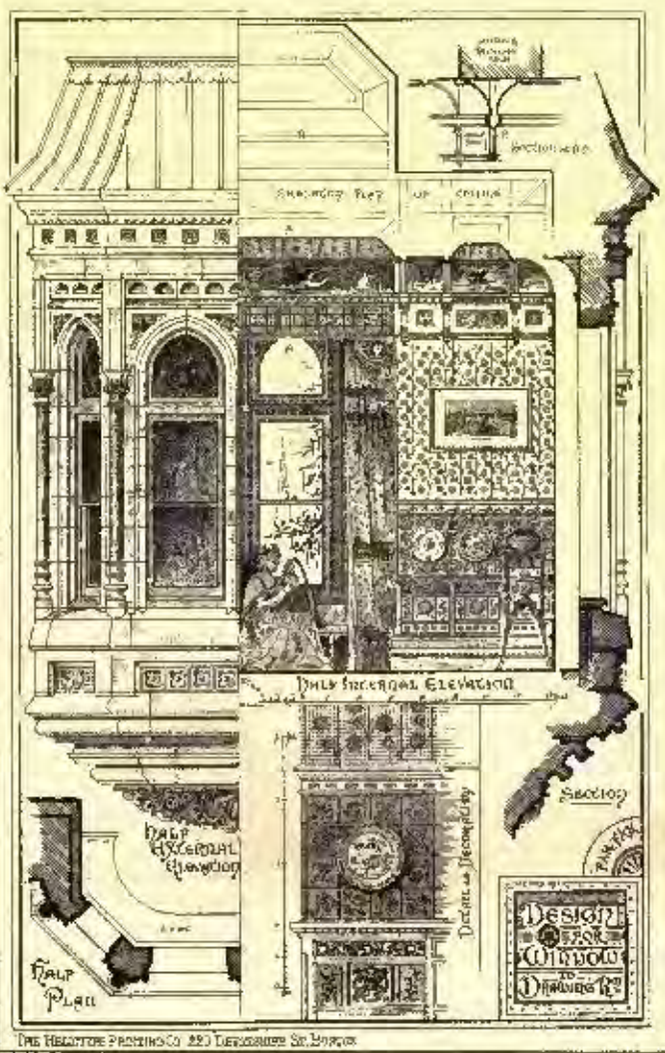
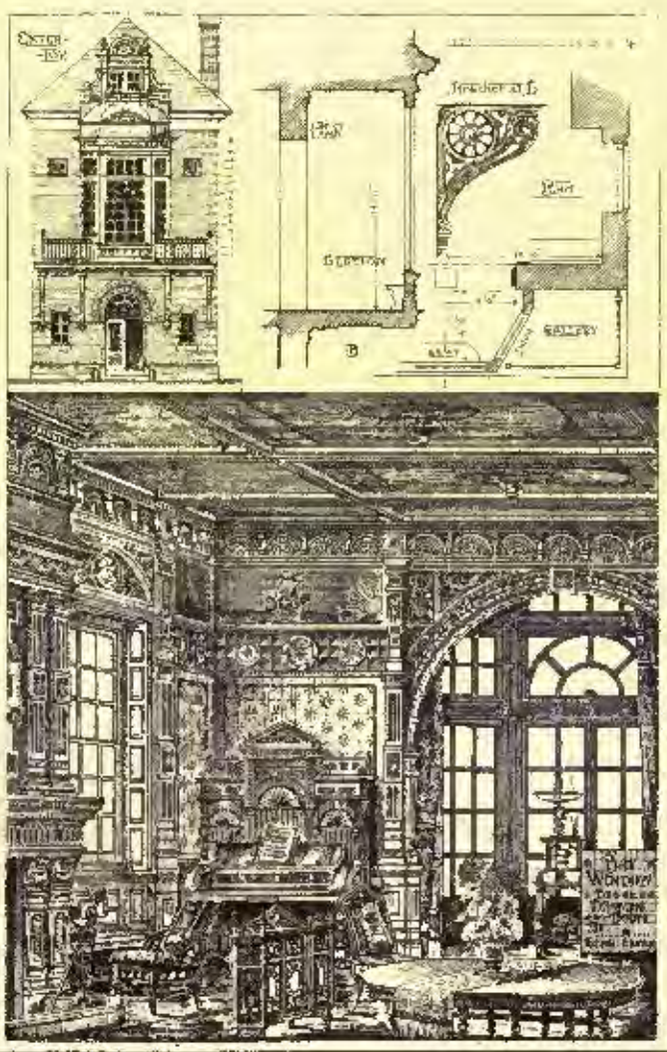
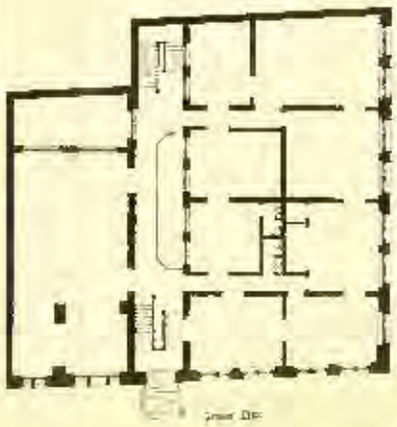








COMPETITIONS IN INTERIOR DECORATION
— No. 2: INTERIOR OF A BAY WINDOW —



TRINITY · PARISH · SCHOOL

—NEW YORK, N.Y.—

R. M. UPJOHN, ARCHT.

THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST BOSTON

over, to whom the city ceded the palace, the project was furthered by the Prussian rulers, when in 1866 the city fell to them, and with it the ownership of the palace. It was a long and tedious work before an architect who had devoted years to the study of the buildings could clear away the accretions of centuries, discover the original plan of the structure, and throw into a model his ideas as to its original appearance. So carefully and so cleverly was this done at length, that there seems to have been no exception taken to his translation of present dilapidation into past perfection. Unfortunately, however, no sooner had he accomplished this much than the Prussian government took the proposed work out of his hands and put it into those of the government architect of the district, — a man who, capable enough in his own field, had until this time been chiefly occupied with railway buildings. Associated with him was a practising architect of Goslar, superintendent of the works, and two others as advisers, so that four brains were set to work on the same problem, with the hope that a successful unity might result from their efforts. It can hardly be a matter of surprise that no measure of success has in fact been attained, but that the restoration must be adjudged something worse than a failure. That some parts of the original structure have been preserved from further decay is all that can be said, and this by no means compensates for the damage that has been inflicted on the buildings as a whole, nor for the alteration and falsifying of the parts in detail.

The imperial residence consisted of four parts, — the large hall, a wing on either side of it and the chapel of St. Ulrich. The great hall was a two story-building, 189 (German) feet in length, 60 in width, and 42 in height to the eaves of the high-pitched roof. In the middle was a sort of transept, which projected little from the building but made a great gable in the front of the roof. The low ground-floor was occupied by one large room, — the gathering-place for the emperor's attendants, the flat wooden ceiling of which was supported by a row of piers and arches running through the middle of the apartment. The upper and principal story was likewise of one room, forming the hall proper, its front consisting of an immense open arcade of seven windows, the centre and largest one being 36 feet high and 24 wide; each window was divided into three by two free columns. Stately exterior staircases gave access to this story. This, the main portion of the palace, had been preserved to the present day in great perfection, considering the age and the vicissitudes it had seen. There is no arcade of the kind at the north that compared with this even in its decay.

Of the original structure of the north wing nothing remained; but the foundations of stone built into the rear wall of the existing building bore the date 1576, so that it was comparatively very recent. The south wing showed of the primitive structure only part of the front wall, and the foundations, including those of the inner partitions. This wing connected the hall with the chapel, — one of the famous double churches of Germany, — a circular building of eminently beautiful proportions, much injured, it is true, in parts, but showing many clear traces of original work.

Passing to the recital of the mistakes — to use the mildest term — that have been made in the so-called work of restoration, be it premised that all the new work that has been superadded to this early Romanesque building has been put up in well-developed fourteenth century Gothic. Further, the original design of the building must undoubtedly have been that of a great hall with two mighty stories flanked on either hand by a wing less lofty and of less stately proportions. This is evident to those who have studied the ruins, and evident no less from the æsthetic necessities of the case when we consider that the wings must have contained the dwelling-rooms, inferior in size as in importance to the great hall. The restorers, however, have seen fit to build the north wing up to the height of the main building and to give it *three* stories. It need hardly be said that a three-story dwelling of the eleventh century, especially where space was available to any extent, would have been a very anomalous structure. Not only is such work a complete lie when it pretends to "restore" the original state of the wing, but it dwarfs and ruins the fine central structure which had so fortunately been preserved to us. Does not the excuse have an old and familiar sound when we read that this was done to provide a suitable residence for future official visitors to Goslar? Further, after much money had been spent on this modern erection, lack of funds was pleaded as an excuse for a shabby profanation of the main building. The pitch of the roof was lowered, among other things, and the high gable fronts, so distinctively German, cut off and hidden under an unbroken roof.

Thus far the restorations have now progressed, but still other desecrations are proposed for speedy execution. It was ascertained by careful scrutiny that the great arcade was originally provided with a defense against the weather in the shape of perforated inner shutters of wood, with small glazed panes inserted, and by heavy curtains. It is now proposed to render the hall more fit for use by nineteenth century officials by glazing the entire extent of the apertures, thus producing, as has been said, the effect of a badly planned greenhouse. Even the chapel itself is not free from the threats of the restorer. The principal interior decoration of the hall is to be an immense fresco representing the "Proclamation of Versailles" in 1871. Thus the aim is avowedly not to guard this fortunately preserved structure of the eleventh century against further decay, nor to restore it to the condition in which it was left by its founder, — the greatest, perhaps, of German sovereigns, — but to transform it into a building fit for modern purposes, repaired and decorated not to the glory of Henry IV. but of William I. When we think of the pride the German people take in the pious and clever rehabilitation of the Wartburg it is hard to realize who in Germany has permitted such desecration, or who has been found to execute it. When we look to the cathedral of Speyer, — perhaps the finest of Romanesque cathedrals, — which was built at the southern extremity of their empire by the same dynasty who erected the "Pfalz" at Goslar in their northern mountains and which is sanctified by the tombs of all four Franconian emperors, — when we look at the careful and reverent and faithful way in which it has of late years been repaired and decorated, it seems almost incredible that in the same country, at the same epoch, — not, it is true, without many indignant protests, — men have been found to maim and desecrate and sheathe with falsehood the great Romanesque palace of the Hartz.

M. G. v. R.

THE ILLUSTRATIONS.

TRINITY PARISH SCHOOL, NEW YORK, N. Y. MR. R. M. UPJOHN, ARCHITECT.

TRINITY Parish School is built on New Church Street, opposite Trinity church-yard. As seen from Broadway, it forms a prominent architectural feature. Trinity square has in this building an exponent of thirteenth century Gothic, in the monument an exponent of the fourteenth century, and in the church of the fifteenth century Gothic. It is rare in this country that we see so prominent examples of the three styles at one glance one might say.

SEMI-DETACHED HOUSES, TRULL STREET, DORCHESTER DISTRICT, BOSTON. MR. JOHN A. FOX, ARCHITECT.

This pair of houses was built last summer for Franklin King, Esq., for the purpose of improving unoccupied land and meeting a want in the neighborhood for small, well-built houses with modern conveniences. They were rented readily at fair rates, while many houses owned by "speculative builders" in the neighborhood could not command tenants.

HOUSE IN DORCHESTER DISTRICT, BOSTON, MASS. MR. JOHN A. FOX, ARCHITECT.

This house, which stands on a steep hill-side, was built last season for James D. Scudder, Esq.

BUILDING FOR N. W. ALDRICH, PROVIDENCE, R. I. MESSRS. WALKER AND GOULD, ARCHITECTS.

This is one of a series of buildings which are to replace those destroyed by the fire of the 27th of September last. It occupies the site of the building in which the fire originated. Both fronts of the building are built of Philadelphia pressed brick, with Amherst stone finish, iron being used for the door-way and sash columns.

DESIGNS FOR THE INTERIOR OF A BAY-WINDOW — COMPETITION NO. II.

Twenty-three competitors have submitted designs in the second competition, and we are inclined to think that the average merit is greater than before. We propose to publish seven of them.

PAINTING AND SCULPTURE AT THE CENTENNIAL.

VI.

[The report of Mr. John F. Weir in behalf of Group XXVII., embracing Plastic and Graphic Art.]

THE UNITED STATES.

IN *genre*, Mr. Eastman Johnson contributed "The Prisoner of State," "The Old Kentucky Home," "Sunday Morning," and "The Old Stage-Coach," which are all representative of the acknowledged excellence of his style. Mr. Johnson's subjects are derived fresh from nature, and are generally illustrative of characteristic traits of American life and customs. They are carefully studied, and always expressive of genuine feeling. They are not altogether free from uncertainty of form and touch and monotony of tone, but no one has more decided individuality and independence in choice and treatment of subject than this artist. His pictures bear the unmistakable stamp of originality. We are never reminded in them of the influence of schools or foreign methods: they rest upon their own merits, and the only comparisons they suggest are those afforded by the truths of nature. "The Old Kentucky Home" is the picture that first gave him his reputation, which every succeeding work has sustained and increased. "The Old Stage-Coach" displays greater maturity of method and breadth of treatment, but in accurate delineation of character "The Old Kentucky Home" is hardly surpassed. The impression made by Mr. Johnson's pictures is a genuine one. We instinctively feel that the artist himself was impressed and sought to express something that touched his sympathies forcibly. This is their interest and power, and criticism starts from this source, rather than from the mere pictorial elements of technical merit that usually, in artists of less character, first engage the attention. Mr. Homer was represented by two pictures, "Snap the Whip" and "The American Type," — the latter a characteristic example of this artist's pronounced individuality. The expression of the figures is in-

tense, full of meaning, and the tenacity of his grasp upon the essential points of character and natural fact is very decided. No recent work of this artist has equaled the remarkable excellence of his celebrated "Prisoners from the Front," an incident of the late war, which is a unique work in American art; but all his pictures have the merit of genuine motive and aim. They are often bald and crude in treatment and unskilful in technical method, while breadth is sometimes attained by the sacrifice of essential details which greater maturity of power would supply without loss to the former; for true breadth is not vacuity, it contains the *sense* of fullness, if not the actual facts of detail. But that this artist evinces unique power and originality the slightest of his works amply testifies, and his aim is a sincere and true one. Mr. Perry exhibited three pictures, — "The Weaver," "Kept In," and "Young Franklin," — all characteristic and distinctively American. This artist has made steady progress and adhered with commendable strictness to subjects within the scope of his powers and sympathies, and he has gradually but surely attained a command over his materials that is worthy of high praise. His pictures are illustrative and pleasing, and evince a conscientious study of his subject. He has not yet attained complete mastery of the figure, nor are his pictures free from labored manipulation and thinness of method, but they evince very genuine qualities of merit.

Mr. LaFarge sent five pictures, — two of figures and three of flowers. The latter are works of peculiar excellence for their purity and charm of color, — flowers forming but the theme for a most delicate and refined harmony that addresses the eye with occult power. Mr. LaFarge is learned in his art, working for profound and subtle results, and no one is more sensitive to the value of mystery in tone and color and of the omission of luminous lights through these qualities. His picture of "St. Paul at Athens" is stamped with great sincerity of aim, and bears unmistakable evidence of power and thought. His works, however, for the most part, give an impression of incompleteness or suggest a deficiency of form, and the drawing, as of the hands in this picture of St. Paul, is often defective. But these short-comings are more than compensated by the superior aim which characterizes his work and renders it highly intellectual, spiritual, and poetic in feeling. The two artists who, with us, have best illustrated the charm of resource that rests in harmonies of color are LaFarge and Gray; and yet no two artists could be more utterly unlike in their methods and aims. Mr. LaFarge shows more profound intellectual aim, tinctured with Orientalism, while Mr. Gray's work is influenced by simpler and more pervasive qualities of tone and the richness that is suggestive of a Venetian feeling. Mr. Gray is not always equal, and his pictures often remind one too strongly of the school that has influenced his style. But his "Apple of Discord" is, perhaps, in drawing, in purity of tone, and in the luminous quality of flesh-tints, unequaled in American art, and unsurpassed by any recent work of its kind in any country. Mr. Irving exhibited "The End of the Game" and "Cardinal Wolsey and his Friends," the latter a labored and skillfully-painted picture. Mr. Irving's style is imitative; but, while it lacks originality, it is not without decided merit, principally in technical qualities. His figures have often the appearance of actors dressed in the costumes of the stage and performing their parts cleverly, though not always naturally or unconsciously. But he has carried his art to that point of elaboration which is only surpassed by the most skillful artists working in the same field, by whom the French school is so largely represented. Mr. Brown contributed his "Curling Match," which is the picture that exhibits his merits to the best advantage. Mr. Brown's subjects are derived from the homely incidents of every-day life, and usually treated with simplicity and naturalness. His realistic powers are marked, but the sentiment of his pictures is not always equal to their technical qualities. Mr. Guy's subjects are of the same class. He contributed three pictures, "Evening," "Solitaire," and "Supplication," all domestic in character. His pictures are painted with skill, but over-elaborated and wanting in distinctions of texture. They are too studied, and consequently often lack spirit and life. Mr. W. H. Beard exhibited his "March of Silenus," a humorous picture, and one of his best, evincing remarkable powers of caricature. Mr. Henry exhibited "The Old Clock on the Stairs" and "A Morning Call in 1800," both very characteristic of this artist's cheerful humor and elaborate work. Mr. Henry's style is often ragged and unskillful, but his aim is a compensation, and he attains happily the sentiment of olden times. Mr. Shade exhibited a very charming picture called "Tantalizing," which evinced great technical skill, a fine sense of color, and a well-disciplined method of work. Mr. Shade is a pupil of the Munich school. Mr. Chase is likewise of the same school; and "Keying Up — The Court Jester" was a very clever example of his facility of method and rich coloring. Mr. Shirlaw, also a student of Munich, exhibited his "Toning of the Bell" and "Feeding the Poultry," two exceptionally strong and admirable works, evincing remarkably dexterous powers of manipulation. Mr. A. W. Thompson exhibited "On the Sands, East Hampton," and "Virginia in the Olden Time," both works showing marked evidence of discipline and careful study. There is a tendency towards the adoption of the French manner in this artist's work which shows whence he derived this discipline. It is a question whether a better manner may not be derived directly from nature without the interposition of another's method of viewing things. This is not only for Mr. Thompson to decide, but for Mr. Chase, Mr. Shirlaw, Mr. Shade, and Mr. Bridgeman as well. Mr. Bridgeman exhibited three pictures of remarkable power, — "Bringing in the Corn," "The Nubian Story-Teller," and "Flower of the Harem," all painted with great skill and truth. Mr. Vedder sent his "Greek Actor's Daughter," a thoughtful and poetic conception, painted with rare feeling and learning. Mr. Benson exhibited his "Strayed Masquers" and several Venetian studies which bore evidence of earnest study and a fine sense of color. Mr. Benson's pictures have of late been characterized by very decided ability. Mr. Rosenthal's picture of the "Young Monk" in the refectory of a convent was one of the most poetic in sentiment to be found in the whole exhibition. It is pure and delicate in feeling, and skillfully painted. The "American Society of Painters in Water-Colors" occupied a gallery in the Annex, and the exhibit was an exceedingly creditable one. The paintings of most marked excellence were by Colman, Tiffany, Swain Gifford, Smillie, Boughton, Nicoll, Richards, Homer, Bellows, and Miss Bridges. Several of these artists were recommended for awards by the judges in this group, but, on learning that the society competed as a body and did not allow of individual competition on the part of its members, their names were stricken from the list.

In sculpture the American exhibit was not satisfactory. Many of our most prominent sculptors failed to participate, and the character of the display was that of being composed of odds and ends, with here and there an occasional work of decided merit. Mr. W. W. Story exhibited his "Medea," and Mr. C. Calverly an admirable bronze bust of "John Brown." Mr. Randolph Rogers sent "Atala," "Nydia," and "Ruth," three statues of ordinary merit. Mr. D. C. French exhibited a very clever model in plaster, larger than life, called the "Minute-Man," and also a bust of Whittier. Mr. Connelly sent a bronze group, "Honor arresting the Triumph of Death," full of spirit and excellently well modelled. This sculptor also contributed his "Ophelia" and "Viola." Mr. T. R. Gould exhibited "The West Wind," and Mr. R. H. Park a number of pieces of which were "Purity," "Summer," and "The First Sorrow." Mr. E. D. Palmer sent his excellent bronze statue of Robert Livingston. Mr. C. B. Ives his "Nursing the Infant Bacchus," and Miss Foley "Jeremiah" and "Cleopatra." Mr. John Rogers sent a complete exhibit of his statuette groups, which are well known for their clever, picturesque representation of incidents of the late war, and traits of American character and life.

The exhibit of sculpture, on the whole, lacked order and arrangement: the works were scattered, and were seldom to be seen to advantage. Nor was there any evidence of an attempt to illustrate the progress and present condition of this art in the United States, of which an interesting exhibit might well have been made.

CORRESPONDENCE.

HOUSES IN FLATS. — THE MASONS' STRIKE. — THE PARIS EXHIBITION. — COMPETITIONS.

London, March, 1878.

With the opening of the Institute and the Association, began, as it were, another year of architectural record, and, singularly enough, the first paper at the Institute took up a subject which is at present occupying a large amount of public attention, namely, the introduction into London of the French and Scotch systems of building houses in flats. Various papers have been read in former sessions, and experiments on a limited scale have already been tried with considerable success; but the matter is now being taken up in a practical form, with a view to provide dwellings of varied accommodation to suit the wants of different classes of society. The paper above referred to, therefore, by Mr. William White, F. S. A., comes quite apropos. He endeavors to show how the middle-class houses of Paris may be made the types of similar dwellings for the same class in London, to their advantage in almost every way over the normal arrangement which has been so long the rule, and be fairly successful. There is no doubt the conditions of living in the metropolis have undergone great changes within the last fifty years or more, and that few or no alterations have been made in our type of house to meet those changes. There is no doubt also of the convenience and economy of living in a house the apartments of which are all on one floor, as against one where they are spread over four or five; but all the same, apart from our English prejudices there are certain disadvantages, — notably arising from living on the upper floors, — which will have to be got over. Doubtless they will in many cases be got over, and where they cannot it is only fair to set them against other drawbacks, under the old system.

Houses for the better or richer classes and houses for the lower or poorer classes, on the "flat" principle, have been to a limited extent in use for some time; but dwellings for the ordinary middle classes have yet to be tried. From these, however, is anticipated for the system the greatest success, if once we had some thoroughly good examples of it that its merits might become known. For years past the tide of middle class people has been flowing steadily to the suburbs, where a fairly commodious house can be had at a moderate rent; but whether it is that the suburbs are now so far off, or that

the amount of daily travelling necessary to reach them is beginning to tell, as it every year increases in amount, there is no doubt that quite recently a desire has arisen, and is growing every day stronger, with many people, to return and live in town, if only they could get convenient houses at reasonable rents. The suburbs are all very well in their way, but their way is very far out from the many advantages that are to be enjoyed by living in town. To meet this comes the proposal to build houses in flats in Central London; the experiment will be an interesting one, for on its success will depend in a great measure the future character of our city streets, since, as any one can imagine, a street designed for complete houses on each story must present a very different appearance from one composed of a number of narrow-fronted houses independent of each other from cellar to garret. The building, therefore, of the first few blocks, will be looked forward to with the greatest interest, from an architectural as well as a commercial point of view.

The masons' strike still drags on its weary course, and there does not seem to be any prospect of an early settlement. True, there have been some proposals made for arbitration, but the masters, who feel confident in their position, declined, and though it is said the funds of the men are getting low, and the strike money to those who are out has been reduced during the last three weeks, still there does not seem to be any talk of giving in, but rather of more aggressive measures. On the other hand, the German and Italian masons are improving in their work at the Law Courts, and are now reported to be very good workmen. The general trade, also, throughout the country is dull, so that there is now no lack of men willing to work at the old prices. This being the case, it is difficult to see how the strikers can hold out, notwithstanding the support (more moral than material) they receive from the country societies. The whole movement seems to have been made at a bad time, as far as trade prospects are concerned, as instanced by the withdrawal of the carpenters' and joiners' notice for an advance in their wages, and the reduction even of the present rates in some of the large country towns. The energetic action of the masters in the importation of foreign workmen seems to have destroyed any chance of the strike succeeding, while the action itself has been the cause of adding no small amount of bitterness to the struggle. When we have Belgian and Swedish iron and wood work imported ready for use, German and Italian masons at work on our public buildings, and the whole internal fittings of a Clyde steamer made in Japan, and sent home ready to put in their place on board, it seems high time that those who claim to have the interests of the working classes so much at heart, should devise some other method of improving their condition than by periodical strikes, such as we are having now, which is said to have cost the masons as much as will take them five or six years to make up, even if they now had the advance of wages they demand. This may be all very well for the sake of a "principle," but to any ordinary observer it seems the principle of being penny wise and pound foolish. They have the satisfaction of having driven work away from the country, of having put a stop to much that was projected, and of probably losing money in the end, even if they gain their point. The relations of capital and labor seem to be in the most unsatisfactory state, which the present proceedings seem little calculated to improve.

Now that Peace has been signed, the work for the Paris Exhibition goes on with more spirit. The Germans have even consented to become exhibitors in the fine art department. Should no more political troubles arise, the show promises to be a very fine one. In the English Department architecture and the arts connected therewith will be represented more fully than in any previous exhibition. Whole houses are being designed and built as examples of the taste now in vogue. There will be an English town house designed by Mr. R. Norman Shaw, R. A., and a country house by Mr. Calcutt, architect, besides the offices of the English Commission in the Elizabethan style. These houses will be fitted up and furnished complete in accordance with their architecture, by such firms as Messrs. Jackson & Graham, Gillow & Company, etc., so that we may anticipate that nothing will be wanting to illustrate in the fullest manner the latest development of household art amongst us. These buildings will form a separate group in the grounds outside the Exhibition, while in the British Section in the palace itself most of the firms which are now devoting themselves to decorative art will be well represented. It is astonishing to think of the immense progress in the way of "Art in the House," which has been made since the London Exhibition of 1862: probably no country in the world will show this so strikingly as England, and if what we have already seen preparing be taken as a fair example of the work as a class, possibly no people will be more surprised than our French neighbors themselves, who were wont to think their work in this department very far ahead of anybody anywhere. It is a healthy, generous rivalry, however, the result of which must possess immense interest for all connected therewith. On a future occasion we may have an opportunity of noticing some of the more prominent contributions, and of judging how far they succeed or fail in representing English art work of the present day.

Your professional readers will have heard with pleasure of Mr. Norman Shaw's election as R. A., and of Mr. Alfred Waterhouse as A. R. A., honors justly merited by the many excellent works created from their designs. Some little disappointment has been expressed that Mr. Bodley was not made the new A. R. A. from among the architects, but we trust the honor is only deferred and that we may hear of his election at no very distant date. Few if any men stand higher than Mr. Bodley as an artist, in the true sense of the term.

Architectural competitions, in spite of the exertions of the Institute, seem to be getting worse and worse. We have had one or two very bad cases lately, — not to mention the Kensington Vestry Hall, where the referee's award was completely overturned and the first prize given to a design he had placed sixth or seventh. The Reading Town Hall is a notable instance. Here the committee called in as referee a comparatively unknown man, who, after picking out three designs, said he could not say which was the best of them; the committee thereupon clubbed the three prizes together, gave a third to each, and ultimately gave the work to the precious referee! who actually accepted it! After this, the case of a city company keeping the designs sent in to them for some months, and then returning the lot because they could not make up their minds as to what they wanted; and the committee for a new hospital keeping the drawings beside them for seven months without coming to any decision, seem very mild indeed, yet all this has taken place within the last nine months, even though some of the best men in the profession were among the competitors, and sent in most excellent designs. Truly architects are a long-suffering race, and a cure for the evils of competition seems well-nigh hopeless.

The Thames Embankment site has finally been decided on for Cleopatra's Needle, so we may expect to see it there some day, unless it is confiscated by the Admiralty Court, in payment of its valuation of £25,000, for ship and cargo, to the owners of the steamer which picked it up abandoned in the Bay of Biscay, and towed it into Ferrol. It is to be hoped for the credit of every one concerned, the claim may be speedily adjusted, and no more "accidents" come in the way of the unfortunate Needle being set up on its final resting-place. In anticipation of a favorable result workmen have begun preparing the foundations on the site.

The Wellington Monument in St. Paul's, — the life-work of Stevens, the sculptor, — is at last said to be finished, but the chapel in which it is placed is not yet opened to the public; when it is, London will find itself at last in possession of a monument worthy of the name.

A NEW APARTMENT HOUSE DESIGN.

NEW YORK.

MR. HENRY J. HARDENBERGH, architect, has in hand an apartment house, which is to stand upon Seventh Avenue, between Fifty-fifth and Fifty-sixth streets, west side. With a frontage of 200 feet upon the avenue, and a depth of 100 feet upon either of the streets, an opportunity is given for a complete work, while the several angles and the chance given for distant views call for care in design. There are many points in which Mr. Hardenbergh has left the traditions which have thus far controlled the designing of this class of buildings in New York. The Hardenbergh flat is the first apartment house yet built which has a semblance of the Queen Anne features in it. They are kept under control. There is no riotous brickwork or exuberant trivialities of form and outline, but a general flavor of the new favorite in the great exterior. The building is really a double one, the main entrances being on the side streets, and each entrance leading to three flats, with six stories in all; this gives a total of thirty-six suites of apartments for the whole block. A feature of the plan is the absence of air shafts or light-wells, those chimney-like excavations which are so often thrust down into masses of structure, with the fond belief that they furnish all in the way of light and air which any ordinary dwelling room should require. In place of these deceptive and expensive little air funnels, the plan has been so arranged as to throw the entire sum of these air ducts into one great area, 90×35 feet; and instead of carrying his construction entirely above this, an artery is left open to the west, leading into the centre of the lines of dwellings beyond, and acting as a feeder to what might otherwise become the stagnant mass of air in the area. This whole question of air shafts would repay a few careful observations and experiments, to determine exactly what motions of air do actually take place, and under what conditions the mass of atmosphere remains strictly stagnant. With the ample space at his command, Mr. Hardenbergh has been enabled to make a real suite of apartments, placed in that juxtaposition which their uses and importance demand. Instead of being strung along a passage, like cells on a corridor, the rooms are grouped, the social or guest room about an ante-room or lobby, while the family or private rooms are placed in more retired situations. There are elevators and lifts, and the usual drying and servants' rooms in the seventh story, which does not show from the street. There will not be stores at present upon the first floor, though the construction is such that a change could easily be effected. The materials of the exterior will be Philadelphia brick and Nova Scotia stone, the latter freely used. There is also a liberal use of terra-cotta panels at various points; iron, except in the fire-proof construction, has been entirely avoided, and from foundation stone to cornice the construction is devoid of all sham and pretence. The whole, finished in a thoroughly first-class manner, by percentage or days-work, will cost about $300,000. Edward Clark, the president of the Singer Manufacturing Company, is the owner, and so far no name has been selected for the structure.

W.

SOOT-STAINED PLASTER.

To the Editor of the American Architect:

Sir,—Your subscriber, who finds his plaster stained by the soot from old bricks coming through, can find a palliative in sizing and whitewashing, two coats, which will cover up the stains effectually.

T. M. C.

NOTES AND CLIPPINGS.

Statue of General Lee.—Mr. Joseph Milmore, of Boston, has been chosen as the sculptor who is to make the equestrian statue of General Lee, which is to be given to the State of Virginia by two citizens of Winchester. The statue will be of bronze, and is to be cast at Chicopee, Massachusetts. The base and pedestal will be of granite and Tennessee marble. It is hoped that the work can be finished within the two and one half years now assigned to the task.

A Heavy Blast.—A very successful blast was made last week in the Middlesex quarry at Portland, Conn. Three drill holes were made, from eight to nine inches in diameter and of a depth of seventeen, eighteen, and nineteen feet, and about thirty-five feet apart. It required seven kegs of powder to load them, and all were fired simultaneously by means of an electric battery. The dimensions of the solid block of stone, moved out several inches, were as follows: One hundred and ten feet in length, fifty feet in width, and twenty-two feet in depth, containing 121,000 cubic feet of stone, or about 10,103 tons in weight.

Death from Lead Poisoning.—A boy of thirteen has just lost his life because of the poison absorbed into his system at a factory in New York where cheap wall paper is made. The boy had been at work at the factory only one week when he showed symptoms of poisoning, and in three weeks was confined to his home by the disease which proved to be fatal.

Almost an Accident.—During the examination of certain highway-robbers in a Brooklyn justice court on the 28th ult., so great a crowd had assembled that the floor sagged perceptibly and caused the spectators to rush from the room in a panic. The building had been condemned as unsafe.

Validity of the Holly Patent.—The Holly Manufacturing Company, of Lockport, N. Y., has just gained an important suit which involves the exclusive right of the company to construct water-works on the Holly system of direct pumping and without a receiver or stand-pipe. The suit was commenced about four years ago at Indianapolis, Ind., before Judge Drummond, in the United States Circuit Court, whose recent decision affirms the validity of the Holly patent.

A Metallic Corner-Stone.—The corner-stone of the shop of the Engineering Department now building in the Navy Yard at Washington, D. C., is a huge mass of metal, weighing five tons, obtained by melting down counterfeit plates and dies captured by the detectives of the Treasury Department.

The Captive Balloon at Paris.—Work is now going on upon the pit in the court of the Tuileries which is to receive the huge captive balloon which is to make ascensions during the coming exhibition. This pit is some fourteen feet in depth, and its sides are plastered with cement. Here are laid the gas mains which are to provide the balloon with the 3,250 cubic yards of gas which will be needed to inflate it. Close at hand is another excavation some hundred feet by forty, and thirty feet deep, wherein will be stationed the steam-engine and windlasses which are to compel its return to earth.

Cement in the Rhine.—We learn from *La Semaine des Constructeurs* that about two years ago a boat loaded with cement sank in the Rhine near Saint-Cunibert. The action of the water soon solidified the cement so that it formed a species of dam and greatly impeded the navigation of the river. The only way to get rid of the obstruction was to blow it up, and the government intrusted the work to Krebs, the manufacturer of dynamite. A charge of about 450 pounds was placed in the middle of the boat, without the aid of divers, and covered by bags of sand which were to keep the charge in place, and also to prevent splinters and fragments from flying. As may be supposed, the explosion of so large a charge produced a violent effect, and not only were the boat and its cargo annihilated, but a large hole was made in the river's bed. The bags of sand seem to have had but little effect, for the shore was strewn with fragments.

Driving Piles in Sand.—The contractors who had charge of preparing the sheet-piling which was to protect the hospital at Berck-sur-Mer, in France, were much troubled in driving the piles, by the compactness of the wet sand, and finally made use of tubes which were driven at the same time with the pile, their lower ends being a few inches below the points of the piles; through these tubes water was forced by small hand-engines and so loosened the sand that the advance of the pile was easy and rapid. In the case of the panels of sheet-piling the benefit was even more marked. Careful observations showed that by the ordinary process it took, on an average, 185 strokes to drive a ten-inch pile ten feet, while 900 blows were needed to drive the panels. The hammer weighed 1,320 pounds, and had a fall of six and one half feet. The average time required to drive a pile and panel was eight hours and a half. After the device of loosening the sand by the pressure of water was adopted it was found that the average time required to accomplish this was one hour and nine minutes, while to drive a pile and a panel more than fifty blows were never required, and often the mere weight of the hammer was enough to sink the pile. It is evident that the same process made the breakage of piles rare, while it also made it easy to withdraw those which were broken or had been driven askant.

An Anomaly in Strikes.—Not long ago a number of able-bodied paupers were set to work to build a poor-house at Sheffield, England, but not being satisfied with the quality of the hash that was served to them as rations, they struck work and even refused to pick oakum until the hash was examined by impartial authorities.

Sound and Solid Rock.—It now appears from an official statement made by Mr. Sutro last Saturday, that the header of the Sutro tunnel was at that time 1,193 feet distant from the point where it will strike the Savage incline. The statement is undoubtedly correct, yet the workmen in the Savage, at the 2,000 feet level, are able to hear the steam drills used in the tunnel header so distinctly that all have heretofore believed the face of the tunnel to be not further away than 300 feet. It was thought impossible that the drills could be heard to a greater distance through solid rock. At the Combination shaft they now say that they were able to hear the blasts fired in the header of the Sutro tunnel when it was 1,200 feet distant. Afterward, when the tunnel was opposite to the shaft, they heard nothing of the blasts, nor could the men at work in the tunnel hear those fired in the shaft, and Sutro finally sent to inquire if they had discontinued work. It is supposed that the stratification and hardness of the rock have much to do with the facility with which it is traversed by sound. Hard rock no doubt conveys sound to a greater distance than that which is decomposed and mixed with clay. Sound would also be likely to follow the stratification. Of late the header of the Sutro tunnel has been in much harder rock than that through which it passed when in the neighborhood of the Combination shaft. At that point, indeed, the ground found, both in the shaft and tunnel, was of the kind called "heavy," being wet, spongy, and much inclined to swell.—*Virginia City Enterprise.*

A New Explosive.—The *Scientific American* states that M. Nobel, the inventor of dynamite, has recently discovered a new explosive substance still more powerful than that. He has given it the name of "explosive gelatine," on account of its aspect, which closely resembles gelatine. The substance is composed of 91 to 95 per cent. of nitro-glycerine, and 5 or 6 per cent. of collodion, mixed together. It is viscous, but can be easily cut with a knife or with scissors, and placed in cartridges or shells. Dynamite, it is known, has the disadvantage of being alterable by water; when it is moist the nitro-glycerine separates from the absorbent. The new substance, on the contrary, does not give the least symptom of exudation; it is impermeable to water, which does not at all affect its explosive properties. It is inflamed in the same way as dynamite, and its power is at least 50 per cent. greater. Italy and Russia have, it is said, adopted this substance for charging bombs, torpedoes, etc.

New-Found Works of Michael Angelo.—The Baroness Adolphe de Rothschild has just bought for $70,000 two groups in bronze, discovered in an old Venetian palace and attributed to Michael Angelo. Each of them represents a panther, on which is leaning a graceful figure of either a satyr or a faun. They are to be shown at the Paris Exhibition.

The Rain-Tree.—Mr. Thistleton Dyer, using notes furnished him by Mr. Spencer, the traveller, disposes of the popular belief regarding the so-called rain-tree of Mayobamba, Northern Peru. [See *American Architect*, Vol. II. p. 390.] The water does not ooze from the trunk, and hardly ever falls in such quantity as to convert the ground beneath into a swamp. The fact appears to be that the liquid which seems to fall from the leaves and branches is produced by a multitude of aphides that live on the juices of the tender leaves. This appears to be analogous to the production of honey-dew from the lime by the agency of aphides.

Statue of an Empress.—A white marble statue of a woman, supposed to be the Empress Julia Domna, has been lately dug up at Djemillah in Algeria. The statue, which is of heroic size and in good condition, is said to be an admirable piece of sculpture.

Indian Relics.—The Smithsonian Institution has lately received some Indian relics from the mounds in Florida, and with them a piece of gold rudely beaten into a representation of the head of a woodpecker. This is said to be the first specimen of gold found among the remains of the aboriginal tribes of America.

A Large Bronze Statue.—A correspondent of the San Francisco *Bulletin*, who has lately visited Nara, one of the old capitals of the Japanese empire, thus speaks of a statue: "Here was erected, 1200 years ago, the largest bronze figure the world has ever known. It weighs 450 tons; and the tiled temple now covers it, without apparent injury to the immense statue. We went around it, but could form no estimate of its size. Our minister at Tokio told me that it was sixty feet from the seat of lotus-leaves to the top of its head, and that a man could climb through the nostril. An officer is said to have taken a chip of the casting, and an analysis of it gave 500 pounds of gold in the alloy. A great halo of gilded wood sets off the dark features as they are revealed in the shadows of the roof."

Stuffing Extraordinary.—What do they do with the old rhinoceroses? has often been a subject of thought to those visitors of the British Museum who know that the staff of the establishment invariably obey the Act of Parliament which renders it impossible to remove anything from Great Russell Street. Every one knows that a stuffed rhinoceros will in course of time become unpresentable, nor can the toughest elephant-hide always keep the straw lining from appearing in a very objectionable way. All who remember the old staircase of Montagu House have felt that there is a limit to the exhibition of a giraffe which had been received at a period so remote that it was described as a "camel-leopard." The difficulty is got over in a way creditable to the ingenuity of the scientific staff of the museum, and honorable to their sense of obedience. They stuff the old rhinoceroses into the new ones; they line new elephants with the unpresentable remains of their forerunners; in the bowels of the last giraffe lie the relics of his predecessors. Truly there are more things in heaven and earth, and even in rhinoceroses, than are dreamt of in philosophy.—*Furniture Gazette.*

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The issue of a suit which was lately brought against the New York Capitol Commissioners is of interest to architects, for it touches one of the most troublesome questions of the contract system. It is less satisfactory in that it has turned, as so many suits that concern the profession have turned, chiefly on some points of verbal interpretation, leaving unsettled points of importance that were really involved, but did not come to the surface, and were taken for granted without discussion. The case was this: a short time ago the Commissioners advertised for bids on the carpenters' work of the Assembly chamber in the new capitol, under an act just passed by the legislature, requiring them to insure the finishing of that part of the building by the first of January, 1879. A law of the State requires that "all contracts shall be awarded to the lowest *bona fide* responsible bidder or bidders," after due advertisement and on the giving of proper bonds by the bidders. The committee, it is true, advertised with the usual proviso, which reserves the right to reject any and all bids, but it is difficult to see how any commissioners, acting under such a law, can reserve this right. The lowest bidder was a Mr. George Martin, whose bid the Commissioners rejected, although he gave the requisite bonds, because they found him to be in pecuniary embarrassment, and the contract was awarded to the next lowest. Mr. Martin therefore applied to court for a writ of mandamus to compel the Commissioners to award him the contract, on the ground that his bid was the lowest, and that he was responsible, inasmuch as the securities which he offered were adequate, which was not denied.

The decision of the court turned naturally on the meaning of the word responsibility. The ruling was that according to the manifest intent of the statute the contractor must not only give satisfactory bonds, but must be himself pecuniarily responsible as well. "Though a person may be able to give security to his employer," said the judge, "yet his ability to do and perform with promptness a heavy contract, involving large expenditure, must greatly depend upon his own resources. For this reason it is assumed that the statute required the successful bidder to be a responsible one, in addition to the giving of the bond for the faithful performance of the contract. Of that responsibility the contracting board must judge." This is tantamount to saying — and the common sense of most people will confirm it — that if the bondsmen only are solvent, and the contractor not, it is the bondsmen only, and not the contractor, who are responsible bidders. The judge also cited — what is of interest only in this particular case — the provision in the recent act which required the Commissioners to "take such measures as shall insure the completion and finishing of that portion of the new capitol" in the specified time, which he said gave the Commissioners large discretion and authorized them to discriminate between bidders, inasmuch as efficiency and promptness in doing heavy work depended largely upon the man who did it, "having reference to his integrity, ability, and responsibility." The writ of mandamus was refused, and the relator, Martin, was ordered to pay the costs.

This decision is reassuring, so far as it goes, to architects and engineers, who have the care of public work. Such men are often embarrassed, in letting the work by contract, by the universal rule which obliges them to award it to the lowest bidder, in spite of the proviso that he must be a responsible bidder. It has been the chief argument of officials who have opposed giving out government work by contract, that no authority is allowed them to reject either dishonest or incapable, or even impoverished bidders, if only they can find adequate security. As to the meaning of the word responsible, in this connection, important as it obviously is, we do not remember any case in which it had been brought into court for definition. There is some relief in the decision of the New York court, — if it is followed, as we presume it must be, — that a responsible contractor must mean one that is solvent enough to carry through his contract; but after all it goes very little way. The court did not, in this case, entertain the question whether responsibility had any other than a pecuniary bearing, and as the word is most commonly and carelessly used, we presume it has not. At the same time it is difficult to see for what reason the responsibility of a contractor should not extend to his capability and his character for honesty. As the usage is, and apparently the law, there seems to be no authority for refusing to put such a work as the Albany Capitol or the Cincinnati Post-Office into the hands of the poorest journeyman who might assume to undertake it, provided he could command money or credit sufficient, nor could the worst character for rascality be made a reason for rejecting him. The purpose of the law is doubtless to prevent favoritism in the distribution of contracts; and its theory, that provided the government is secured against pecuniary loss, its officers can exact the quality of work that they require. It is, to our mind, directly demoralizing to require that such officers shall enter into a struggle of wits with sharpers, or devote themselves to extracting satisfactory work from incompetent men, if it can be avoided, — and it ought to be possible to avoid it by giving a proper discretion to them. If it be held that the government must assume all men to be honest, it is still beyond the stretch of official optimism to assume that every one is capable of doing difficult work satisfactorily. Or it may be said that the necessary authority cannot safely be deputed; and if we accept the theory that our chosen officials are as likely to be untrustworthy as any contractor who may hover round them in search of a job, we may at least remember that they are more directly under control, and that the temptation to collusion with dishonest contractors is as great after contracts are awarded as before. The proper remedy, we believe, is in giving officials a good measure of authority and holding them to a strict accountability for the use of it.

Mr. Samuel B. Tebbetts has taken up the cudgels against the Commissioners on the Indiana State House, and, as it is generally understood, on behalf of the architects who think they were wrongfully treated in the competition. As a taxpayer of the State he has applied to the Superior Court for an injunction to restrain the Commissioners from accepting Mr. May's plans and engaging him as the architect of the capitol, on the ground that they have refused to be bound by the law under which they have been appointed; that their action is illegal and "contrary to equity and good conscience." Mr. Tebbetts's complaint alleges: that the experts appointed were not allowed by the Commissioners to make a thorough examination of the different plans and specifications which were submitted; that they were ordered to carefully estimate on only two designs, and to compare the others with these by simply cubing their contents; that they did not test the estimates of Mr. May's design; that it could not be carried out for the estimated cost; that it was condemned by the experts and adopted by the Commissioners against their report and judgment; and finally that the building, if built in accordance with the plans and specifications, would not be permanent or safe, but would fall by its own weight, or upon a slight increase of weight or pressure. He therefore prays the court to set aside the award of the Commissioners and perpetually enjoin them from carrying out Mr. May's plan, but to compel them to make a new examination and judgment of the plans which have been submitted. According to the Indianapolis *Journal*, the competing architects maintain that all these accusations can be maintained, and are divided in their minds whether their remedy is in requiring a new competition or a reëxamination of the old one.

We have no means of judging the merits of the Commissioners' selection, but to architects in general, and for people outside of Indiana, the most important point in the case is the treatment of the experts by the Commissioners. The legislature apparently meant, as it certainly ought to have meant, that the Commissioners should pay deference to the advice of the experts with whom it required them to consult. The principle thus recognized is one which it is of great importance to have recognized in competitions. There is reason to believe that on the contrary the Commissioners arrogantly overrode the judgment of their professional counsellors, and suppressed their report. It is very desirable that this report, which ought to be the most valuable fruit of the deliberations of the Commission, should be made public, both for the information of the people of the State, and because such a report is of technical value everywhere. If the architects are wrong, and simply smarting under the soreness of disappointed competitors, they have their natural reward for going into an oppressive competition, and the Commission ought to be justified by the publication. But if they are right, the remedy called for in the complaints that have been entered seems a lame and impotent one. The charges brought against the Commissioners are serious. There is not much hope of getting a fit decision from a body which had justified them. It may be possible to lead the horse to the water, but it is hard to see how a whole legislature could make him drink. The only proper treatment of such a commission would be to abolish it. Then if a new one were appointed, the wise thing to do would be to allow a board of experts to select a design and leave the Commission to carry it out.

The day after Mr. Tebbetts's complaint was filed, eight of the competing architects, represented by one of their number, entered an application for an alternate writ of mandamus, to compel the Commissioners either to reconsider the plans that have already been received, or to call for a new competition. The application recounts substantially the same grievances as the first complaint, and says that Mr. May's plans and specifications are incomplete and insufficient; that the building would be unsafe, the walls not being thick enough, nor the floors strong enough, nor the substructure heavy enough; that it is not properly lighted, and its architectural effect is beneath the dignity of the State; that it will cost a great deal more than the two millions allowed by law, as was declared by the experts, and known by the Commissioners. We must confess that we are at a loss to see the necessity of this second application. So far as the Commissioners evaded the law, or set it at naught, in their action, by overriding the experts whom they were required to consult, it is desirable that they should be brought to book and frustrated. But the first complaint would seem to be sufficient for this, if any would, and it seems to us that the architects weaken their case by descending to criticism of their competitor's plan. As for the Commission's choosing the wrong plan, as commissions are very apt to do, this is one of the incidents of competitions which those who rush into them must expect, and for which there is ordinarily no remedy, unless dishonest collusion can be proved. We will not say that there are not cases in which the competitors are justified in resisting and overturning, if they can, the decision of a committee. Or when it came to the pass that there was actual and visible danger of seeing an unsafe building put up, they would be justified in protesting in the interest of the public, but not in their own. But when an architect enters a competition, it is with an implied agreement that he accepts the decision of the judges; only fraud or illegal action justifies his resisting it, and any accusation of this ought to be kept entirely apart from professional criticism. If a bad plan is chosen, the committee must bear the responsibility; it would be intolerable if it came to be a habit for disappointed competitors to fall foul of their successful fellow and pull his plans to pieces in public, however bad they might be.

A joint resolution was passed a few days ago, by the House of Representatives, authorizing the Commission on the Washington Monument to spend thirty-six thousand dollars of the money heretofore appropriated to it in strengthening the foundations, so that the work might go on. The resolution was stoutly opposed by some members,—by Mr. Conger, on the ground that the monument was in the wrong place and was insecure; by Mr. Cox of New York and Mr. Clymer, because it was unsightly and unsuitable as well. Mr. Cox proposed that the monument should be razed, and another, such as should be approved by persons of refined judgment in matters of art, an arch for instance, should be built on some higher situation. This drew from General Butler the characteristic questions, whether there was any place that Congress wanted to arch over; whether there was an arch anywhere which led nowhere; and whether the gentleman wanted any more such exhibitions of modern taste as the present calico fence at the foot of the hill near Pennsylvania Avenue. He also made the suggestion, which is worth preserving for future use, that the House should allow those to whom it had intrusted the matter to go on with their work "without undertaking here, in this House, to decide questions of civil engineering." Mr. Clymer proposed that an arch should be set over the approach to the eastern front of the Capitol. The kind and degree of interest which the House took in the matter appears somewhat from the facts that those who showed any interest in the debate seemed vastly more concerned that the monument should be conspicuous than that it should be appropriate; and that for 227 members who voted when the doorkeeper question came up immediately after, only 153 voted on this question,—ninety-four for and fifty-nine against the use of the appropriation. Mr. Foster made the point, with authority, we presume, though we have never heard of it, that Washington himself selected the present site for the monument, which was then exactly in the centre of the District. It is well known, however, that the first planners of the city miscalculated entirely the directions of its chief growth, and the relative importance of its different quarters. But we wonder how great satisfaction it would have been to Washington, or to the people who loved and reverenced him, to be told that after three generations of promising, an indifferent Congress would, as much to save themselves trouble as anything, vote money to bolster up a private undertaking that had languished for thirty years, in which nine tenths of their countrymen took no interest; upon which the engineers of the Government looked with distrust, and most of the qualified judges who had considered it as a matter of art, with extreme disapproval.

The Secretary of the Treasury has communicated to the House of Representatives his answer to their resolution of inquiry concerning the adoption of the Metric System. He acknowledges that the system is "the more perfect theory," but does not think it desirable to make it obligatory in any transactions at present; on the contrary, he thinks great confusion and much litigation would result from adopting it before it is well understood and acquiesced in by the body of the people. Mr. Elliott, chief clerk of the Bureau of Statistics, in a letter appended by the secretary, suggests that the system might be made obligatory in international transactions — custom-house measurements and the like — or for postal charges; and the secretary thinks that it might properly be adopted by Congress in raising the tariff, but doubts if much good would come even of this. Mr. Hilgard, assistant in charge of the Coast Survey, finds it "difficult to say how an obligatory statute could be executed in this connection." He thinks that if it were left to itself, its growth would be very slow, and it would probably not come into use in less than fifty years, but that an active propaganda would hasten it, and so would the fixing of a time in advance at which it should become compulsory, which time might be safely set at the year 1900. But Mr. A. H. Stephens is not disposed to wait for this, and has introduced a bill of his own into the House of Representatives, not to compel, but to encourage its use; and fancying that the long names by which the measures are known are against it, he has tried to smuggle it in under some very odd-sounding names, such as 100 hairs make a nail; 100 nails make a meter; 100 meters make a kile; 100 corns make a nut; 100 nuts make a bipound or bip, etc.,—of which some newspapers have made sport very disrespectfully. Mr. Stephens apparently forgets that his countrymen are fond of big words, especially of those that have a Greek sound, and are delighted with an opportunity to make their own abbreviations, which they do with great promptness and decision.

Mr. Keely and his motor will not down. Lately Mr. J. B. Knight, secretary of the Franklin Institute, has been examining the invention, and his testimony is not favorable. He even intimates that Mr. Keely falsifies his gauges so as to make them show a pressure many times higher than really exists. Mr. Keely furnished him with a sample of the so-called vapor used in the machine, which was charged into an iron vessel under a pressure, it was claimed, of twelve hundred

pounds to the inch. This, upon examination, proved to be only atmospheric air, and the tension of it was found to be only two hundred and twenty-five pounds to the inch. We have before mentioned (*American Architect*, No. 96) the reason there was to believe that Mr. Keely's force, whatever it was, could only be made to act intermittently and through a very small space, so that it was not likely to be useful. Even under the enormous pressure which he claims, a small quantity of air would lose its tension very quickly by the inevitable expansion in being drawn off for examination. It would probably be very difficult to test the accuracy of his gauges, or to judge of it with certainty without a careful examination of their construction. But we do not understand that Mr. Keely allows his machine to be taken to pieces, or even that he lets it be known just what is inside. Mr. Knight concludes that the "multiplicator" and the "reacting device" cannot produce the force that is claimed, and that their enormous strength is unnecessary and only contrived for effect; that the gauges were wrong, and the pressure probably in no case greater than five hundred pounds to the inch; that the vapor which Mr. Keely has discovered is only condensed air, and his vacuum produced not by absorption of this vapor but by mechanical exhaustion. On the other hand, Mr. O. M. Babcock writes to the Philadelphia *Bulletin*, deploring the backwardness of scientific men in admitting new discoveries, which most people are accustomed to consider one of the world's great safeguards; and says of the Keely motor that: —

> It is so far in advance of the present stage of human knowledge, so far above the highest flights of imagined possibilities, so far superior to human conceptions, and so completely upsets some supposed settled theories, that learning stands appalled at the wonderful demonstrations, and in silence waits to see whether it is real or only a dream: while Stupidity cries "Deception, fraud, collusion," Conceit says with a swagger, "Nothing new," and Cowardice closes its mouth and watches to see upon which side, by success or failure, it will first warrant to speak, for scarcely any deprive this generation from profiting by the fruits of the enterprise.

He offers to give one hundred dollars to any one who will show that there is anything wrong with the gauges, and that Mr. Keely does not "show pressures of his so-called vapor of ten thousand pounds per square inch, and this without pump or piston."

Mr. Ruskin had printed some time ago autographic reproductions of a few of the etchings of Turner's "Liber Studiorum." The original plates were etched in outline by Turner himself, it will be remembered, and then handed over to the engravers to be worked up in mezzotint, except when he did the mezzotinting himself, which he did in ten of the plates. The reproductions did not satisfy Mr. Ruskin, and he did not continue them. He has, however, been encouraged by some heliotype reproductions to send a score of the etchings, which are extremely rare, to Professor Norton, of Harvard College, who will have them printed in *fac-simile* by heliotype, together with some of them which are in Mr. Norton's possession, making thirty or thirty-five in all. They will be printed with great care, for subscribers only; and the number of copies will be limited to the number of subscribers, which is perhaps to be regretted. It is expected that they will be issued in June.

THE OLYMPIAN EXPEDITION.

The representatives of the German Empire at Olympia have recently published, in a second portfolio,[1] the results of excavations which, during the winter and spring of last year, were made in the Altis, that sacred inclosure of the Greeks at the confluence of the Kladeos and the Alpheus rivers. This later part of their work, brief as it is, contains so much new material, not only for the study of Hellenic antiquities and civilization but also for the history of architecture, that the only previous authority of note concerning the Olympian plain, the *Expédition scientifique de Morée*, may be regarded as wholly superseded in so far as it relates to this subject. Indeed, after an inquiry into the accompanying German text, one cannot but feel astonishment at the boldness of M. Abel Blouet in making such elaborate restorations from the inadequate facts he obtained by a most incomplete examination of the ruins. Yet honor is not to be denied him for having been the first to penetrate at all beneath the present surface of the earth. The great temple of Zeus, like all the monuments of the Altis, was, until within this century, known only from the scattered notices given by ancient writers, if we except the account left by Pausanias,[2] merely unimportant mentions. The first description of the condition in which the ruins of the city of Elis[3] have remained since their submersion ten centuries or more ago, was given by Mr. Stanhope in 1824. It was shortly after, in 1829, that the base of the temple was partially unearthed and measured by the French expedition referred to. Since that date nearly half a century has again elapsed and no further investigations were undertaken on the spot until the autumn of 1875, when Professor Dr. Curtius began the work of excavation which is now being carried on. Thirty years ago, in 1848, this same expedition was planned by the celebrated geographer Ritter and Herrn Bötticher and Curtius, but the political uneasiness of that time prevented its departure from Berlin. The treaty which Germany, at the instigation of the latter gentleman, has now concluded with the government at Athens allows everything that may be discovered, all statues and remains of whatever description, to become the property of Greece. The empire certainly labors most unselfishly for the advancement of science, as it thus gives up its claim to any of the valuables it might unearth, contenting itself with results which it shares in common with the whole world. And these results are already of the greatest scientific and artistic importance. We might not regret the apparent illiberalness of the treaty, if convinced that all brought to light in Olympia would hereafter be accessible to universal scrutiny and enjoyment by being worthily provided for in Athens. But that doubts must be entertained of this is lamentable. To-day the statues and architectural fragments lie huddled together in the wooden sheds which the Germans were obliged to build for their temporary reception and shelter. Will Greece ever undertake the labor and expense of conveying these colossal marbles to Athens, through a country almost destitute of roads, and then, after placing them in museums, will it see that they are correctly ordered and catalogued? Those who know that poor and restless land in this century, striving continually for high-flown political aggrandizement, while wholly destitute of means, will not be able to repress a doubt.

It is to be feared that with many discussions and fine phrases no satisfactory result will be reached, but that the statues will be left in their present miserable condition for years, or, what is worse, that they may at last find their way to Athens, there to be thrown together into some government warehouse in such disorder that after a decade no one will be able to decide upon their relative position and significance; the very field of their discovery may be forgotten. Such evils have been known to take place. It is almost to be wished that the Olympian marbles might be carried to Berlin; they would there most certainly elevate the "National Ausstellung" to a formidable rival of the British Museum. For the works of sculpture with which we have here to deal are of the very best period of Greek art. Few originals of the time of Phidias and Praxiteles have hitherto been known, and here whole groups of figures have been disentombed which were formed by their emulators Paionios and Alkamenes, at the very time when Phidias and his scholars were working, in their little house by the banks of the Alpheus, upon the great chryselephantine statue of Olympian Zeus. The world has few creations of greater beauty, of greater dignity and repose, than the best of these fragments which now lean against the sides of the German sheds.

Yet, as before said, the gain in architectural respects is hardly less. The krepidoma[4] of the famous temple of Zeus has for the first time been entirely uncovered and its expanse accurately measured. The dimensions of the height, also, are approximately ascertained, and the restorations which architect Adler promises in the form of a monograph will, without doubt, be final. We shall then look with interest to a confirmation or disproof of that curious and elaborate system of proportions which the Professor of the history of art in Harvard College has ingeniously applied to this structure.[5] At present we must be contented with the small wood-cut of the plan which is given in the letter-press, and with the lithographic plate of the front elevation. This is drawn on the same scale, 1:100, as the engraving of the front in the *Expédition de Morée*, and shows the chief error of the latter to have been the excessive height allowed the columns. Their dimension, as deduced from repeated measurements of the separate drums plus a small allowance for their joints, is stated as 10.48 m.

On the French plate it is 11.18 m., a very considerable variation, nearly one third of the lower diameter of the shaft. The magnitude of the plan does not so materially differ, but in the interior of the naos there is an arrangement of hypæthral columns entirely at variance with that suggested by Blouet. It is disappointing to learn that sufficient parts of the roof-opening have not been found to justify a reconstruction of it; still, another year may bring material evidence for a definite decision of this vexed question. From the front, the dimensions of which alone are absolutely certain, it is clearly to be seen that the proportions of the Zeus temple are among the most vigorous known, are equally distant from the exaggerated ponderousness of the early Sicilian examples, and from the graceful elegance of the later Attic Doric, which was ever prone to degenerate into mere coquinity. The temple of Olympia in general composition bears the stamp of the majestic grandeur and firm organism of the earlier Doric; its beautiful details may be compared to those of the

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[1] Die Ausgrabungen zu Olympia. II. Uebersicht der Arbeiten und Funde vom Winter und Früh-jahr 1876-1877. XXXV. Tafeln. Herausgegeben von E. Curtius. F. Adler und G. Hirschfeld. (Berlin. Verlag von Ernst Wasmuth.)

[2] In his travels through Greece. Ἠλιακῶν περιήγησις. See Book V., which relates to the country of Elis. Chapters 11-16.

[3] The title of Mr. Stanhope's picturesque work is The Ruins of the City of Elis, Olympia, by the way, was never a city, but even a town, properly speaking.

[4] The krepidoma or sub-structure of a temple comprised the foundation (stereobate) and the stylobate or steps bordering it.

[5] The Dimensions and Proportions of the Temple of Zeus at Olympia. By Charles Eliot Norton. Proceedings of the American Academy of Arts and Sciences. Vol. xiii. 1877.

older Parthenon, which the writer conceives to have been built at about the same time.

By the discovery of the greater part of the pediment-groups the original arrangement of that in the eastern gable is evident. The breadth and power of this creation of Paionios, when compared with the arbitrary reconstruction of the group by the French, causes the latter to appear to the greatest possible disadvantage. A more edifying example of the infinite superiority of Greek originals over restorations made even by the most capable and cultivated of modern artists could not be desired. The fine lithograph of the temple front is not pleasing; the entablature is disfigured by the huge shields of the Roman Consul Mummius, and the entasis of the columns is exaggerated with unhappy effect. Still the drawing does not pretend to be more than a makeshift, — a schematic rendering of the dimensions in default of the accurate drawings which are to be published on the completion of the discoveries. For, though the excavated space around has been cleared, the larger stones of the ruined temple, the overthrown columns and epistyle, have not been removed, and under these many a fragment of the marble roof and upper detail must lie concealed.

The building appears to have been completely dismantled before the occurrence of that earthquake which left not a shaft erect. It is evident that the final demolition must have been the result of some convulsion of nature; the colossal drums are flung out from the cella, far beyond the stylobate, and yet have remained in due order beside one another. It is as though the careless motion of a hand had lightly pushed over little piles of coins, so evenly do the stones of each column lie. The destroying force may be said to have worked from the centre, a huge fissure in the sternobate giving additional weight to this supposition. The story of their disorganization as told by the ruins is an interesting one; neglect and plunder, fire, earthquake and flood, each has done its part. Attempts were made in vain during the first year to discover the remaining buildings of the Altis under the sand with which the Alpheus has flooded the plain. This season the efforts were attended with greater success. Prospecting trenches struck upon the Heraion, and from the map of excavations its substructure seems to have been laid well-nigh bare. This Doric peripteral temple appears from the short-coming reports to be the most abnormal example of its style on the continent. With a hexastyle front it has sixteen columns on the side which gives it a very exceptional length. May not this unusual number stand in symbolical relation with the sixteen maids of Hera for whom the temple was built, who here held their festivals and represented the sixteen cities of Elis at that time in existence? Be that as it may, the structure is most curious, there are unnatural variations in the number of the channellings of the columns, and their capitals are of diverse forms. The foundations inside the naos seem to have been intended for columns, and these suggest an hypethral disposition which, from the agonal[1] destination that we learn through Pausanias[2] the temple had, seems not improbable. In the cella were found the weathered remains of sandstone Ionic capitals and fluted shafts: the interior order may possibly have been of that style. If it prove so, this will be the first known instance of the adoption of that dual system which in later times became quite general. But with our present defective knowledge all suppositions are vain. It is to be hoped that the thorough investigators may find warrant for a trustworthy restoration, and that they may be pleased not greatly to delay its publication. Of the Byzantine church which was described in a note in No. 103 of the *American Architect*, nothing further of import is stated; indeed, the excavations at its site have been discontinued, as it offers little of architectural interest not already published.[3] A Roman exedra, built of brick and situated near the Heraion on the northerly confines of the Altis, should not be forgotten. A semicircular structure it is of very considerable size, the diameter being 15.70 m. The thickness of its walls (1.80 m.) has led to the opinion that it was roofed, but at present there is no means of ascertaining in what manner. More interesting are the two little round temples which flanked it; each a monopteros of eight columns, they were designed to receive statues, perhaps of the Roman emperors. From the plan their greatest diameter appears to be about 4 m.; it has not pleased the expedition to print any exact information regarding them. In character midway between these architectural discoveries and the unearthed statues, there remains as an especially valuable result of this year's work the base of the Nike statue of Paionios. Being the only pedestal of the period which has been found at all intact, it is most noteworthy. It consists of superposed triangularly prismatic stones, seven in number, which vary in height from 0.60 m. to 0.70 m., and are surmounted by a cornice moulding somewhat similar to the capital of an anta, and supported by a profiled socle and base. The plans of separate prisms diminish in size as they ascend, so that while immediately above the socle the length of the triangle side is 1.40 m., under the capital it is but 1.15 m. The shaft consequently appears very delicately stepped. The unsatisfactory representation of the Nike in the line lithograph shows the statue as facing the angle of its prismatic support; in the letter-press, on the contrary, it is stated that an examination made since the publication of the plate has shown, from the mark of the figure on the upper block, that it faced one of the sides, not one of the angles; and this from very evident reasons seems a far more natural and befitting arrangement. This restoration is altogether ungraceful and not pleasing: it would have been well if the plate had been omitted from the portfolio. Various walls and foundations discovered in parts of the Altis are of greater archæological than architectural importance, fragments of stone and terra cotta, details, gutters, beam-coverings, etc., in some instances with ornament in relief, but more frequently in color, promise, when systematized, to be more valuable additions to our knowledge of the spirit and methods of antique building.

Interesting in every respect, and profitable beyond the most sanguine expectations, have already been the results of these excavations in the Altis of Olympia. J. T. C.

[1] The agonal temple was not solely consecrated as a dwelling of the god, but was used during the celebration of games and festivals. It thus stood in need of the light of day, which was admitted through the hypæthron. Compare Bötticher, "Ueber agonale Festtempel und Thesauren," and the discussions between Ross, Herrmann and others which this publication elicited.

THE PROPORTIONS OF THE TEMPLE AT OLYMPIA.

Professor Norton's essay[4] is the latest venture into a tempting and dangerous field of speculation: tempting, because every line of inquiry that offers even a faint hope of finding out what the makers of masterpieces were thinking about while at work has a great and legitimate fascination, while the juggles of arithmetic always seem just on the point of making some profound revelation of truth; and dangerous, because the interest of the search is apt to bias the judgment, and because it is, in the nature of the case, hard to tell how far the numerical relations that are sure to turn up are really due to anything peculiar in the data, and how far they are due simply to the means of investigation. It is not easy, for instance, in reading Mr. Norton's paper, to see at once whether the curious relations between the different parts of the Olympian temple that his cyphering brings to light, really illustrate the theory of Greek architecture, or whether they only illustrate the theory of numbers.

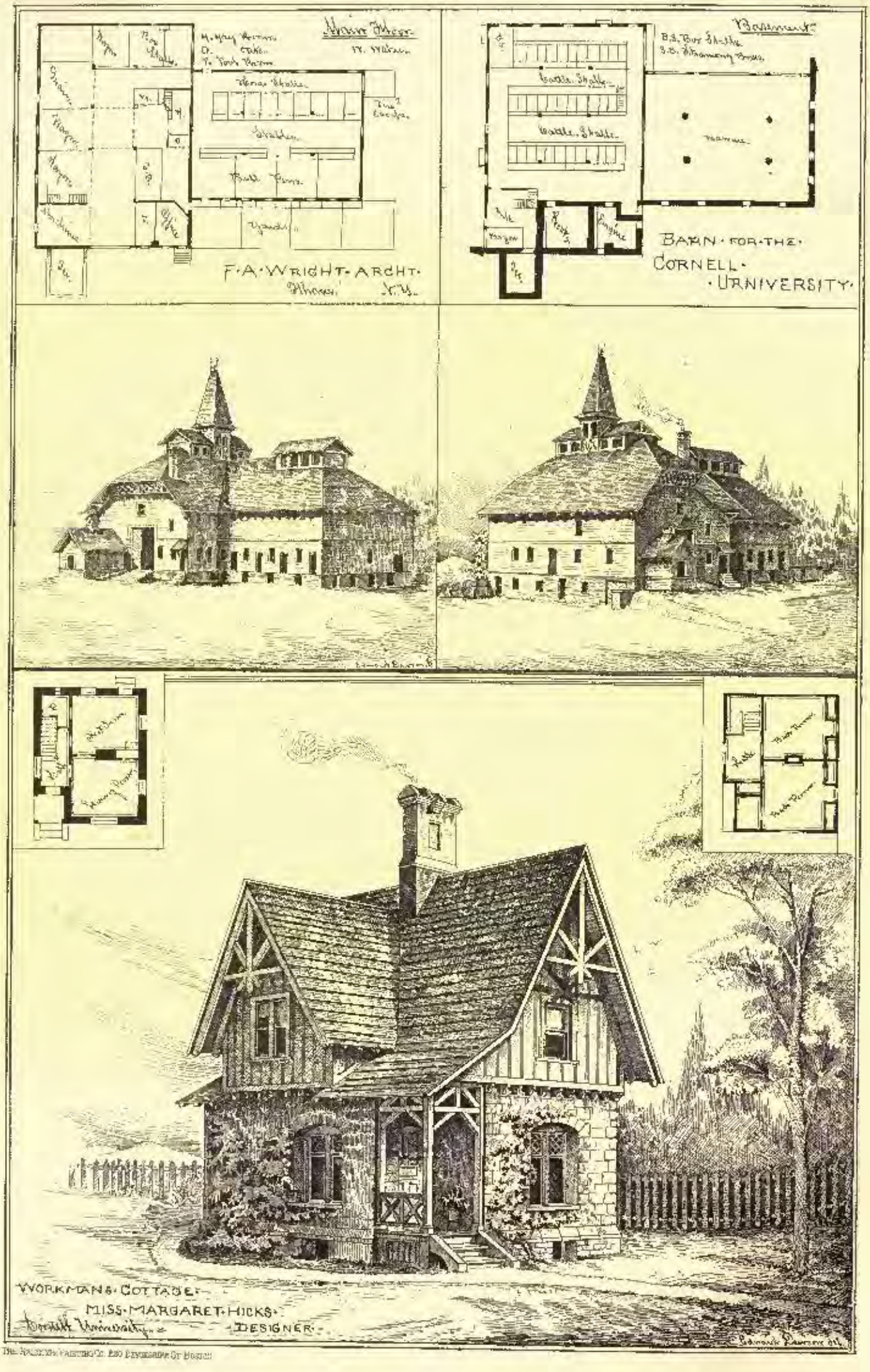
The point which his figures go to establish, or, as he would prefer to say, would seem to do so, is that the builders of the temple in question were guided in their choice of dimensions by the Pythagorean doctrines of number, giving a conspicuous preference to the numbers 3, 5, and 7, which, among others, he shows that the Pythagoreans held in high esteem. The numbers 35 and 105, multiples of these, also appear constantly in his tables; while the front of the temple would seem to have measured 735 minutes, each minute being a sixtieth of the lower diameter, and that diameter itself 7.35 Greek feet, if the size of the column and the size of the foot are correctly assumed. Now 735 is, by a curious coincidence, just seven times 105. It is also assumed, in accordance with some analogies derived from other temples, that the width and height of the temple and the height of the column are to each other as 7, 5, and 3, although these analogies seem to have been misleading, since the recent measurements now give a different proportion. We are inclined to believe also that this recurrence of the number 735 is merely an accident, and that it must have been unknown to the builders. For, in the first place, the largest measured dimension of the lower diameter is 2.344 *mètres*, which would give in Greek feet from 7.082 to 7.313, according as we take the largest or the smallest estimate for that measure given by different authorities, the standard adopted in his essay, indeed, giving only 7.279. To jump from this to 7.35 seems unnecessary. Moreover, since decimal fractions and estimating by percentages, which enter so freely into modern forms of thought, were unknown to the ancients, and their means of expressing broken numbers was rude in the extreme, it would seem that even if the dimension 7.35 were just what they intended, they would have called it seven and seven twentieths. But we fancy that what they really intended was to have the diameter seven feet and a quarter, or seven and a third, this inch of uncertainty as to their intention being less than the admitted range of error in the computations. Besides, reckoning the total length of the front of the building in minutes seems an unlikely procedure.

"It would seem," says Mr. Norton, "that the architect, having determined to base his design upon 35, the number called harmony itself, had exercised his ingenuity in devising such dimensions for his temple as should form a complete and most complex composition of harmonic relations." But the constant recurrence of the numbers 35 and 105 is due to the assumption, made from certain analogies, that the upper diameter of the shaft was intended to be three quarters of the lower diameter, the sum of the two making seven quarters. As the lower diameter is divided into sixty minutes, each quarter diameter measures fifteen minutes, and we have at once the factors 7, 5, and 3. The number of minutes having been originally set at sixty, because this number is divisible by 3, 4, and 5, the presence of 3 and 5 in the quarter diameter does not need to be accounted for, while the assumption of three quarters of the lower diameter for the upper diameter accounts, as we have seen, for the presence of 7 in their sum. But even if the source of these numbers were more occult than it is, we should hesitate to attach any special importance to them, for the operation of adding together the two diameters seems a meaningless one, and we cannot entertain the idea that the main proportions of the temple were laid out in terms of their sum, as the paper supposes. It is conceivable that the mean diameter may have been used as a modulus, or common measure, which would

[2] See the work before cited, Book V., chapter 16.

[3] In the *Expédition de Morée*, plate 81.

[4] The Dimensions and Proportions of the Temple of Zeus at Olympia. By Charles Eliot Norton. From the Proceedings of the American Academy of Arts and Sciences, vol. xiii.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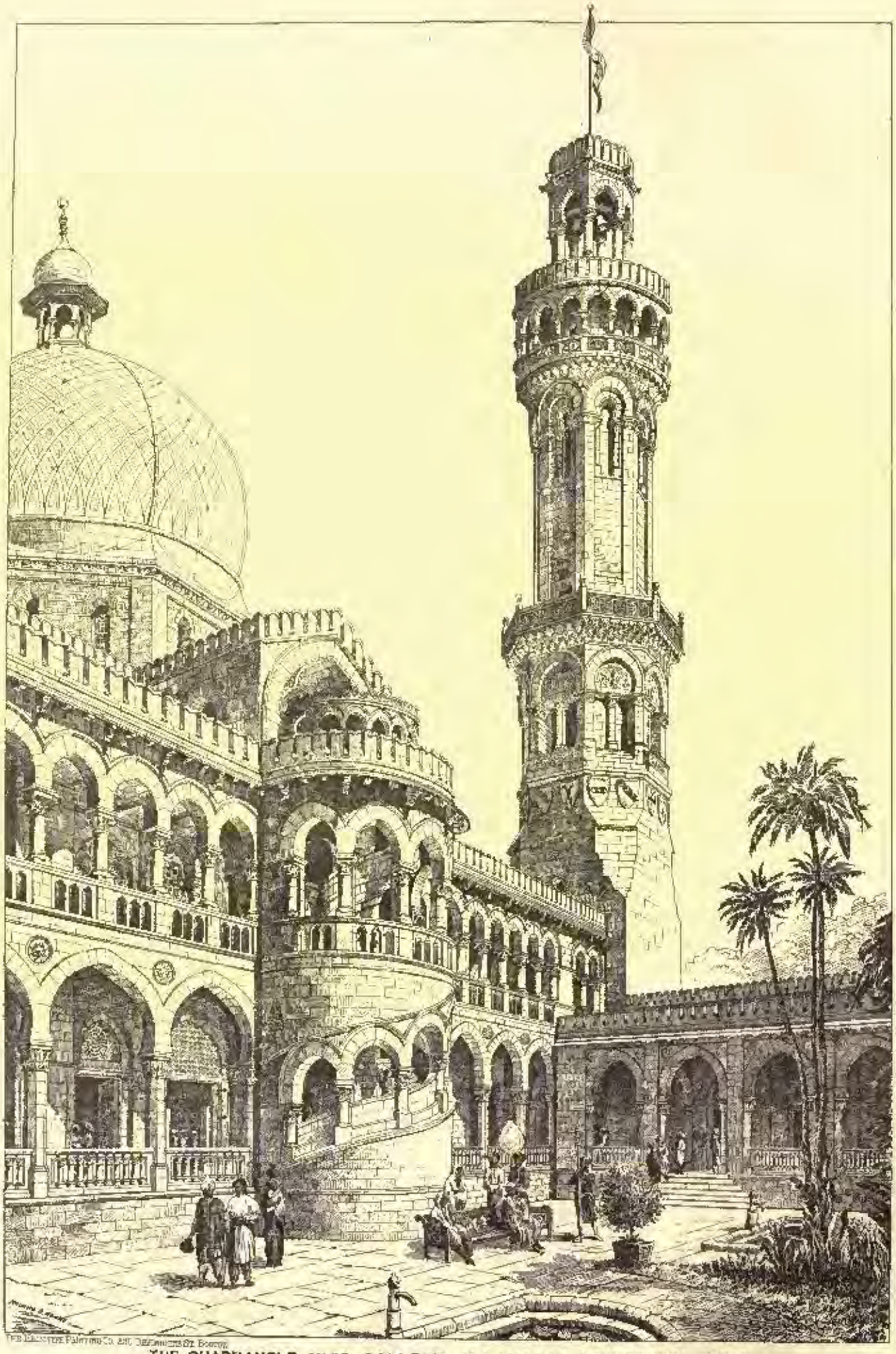
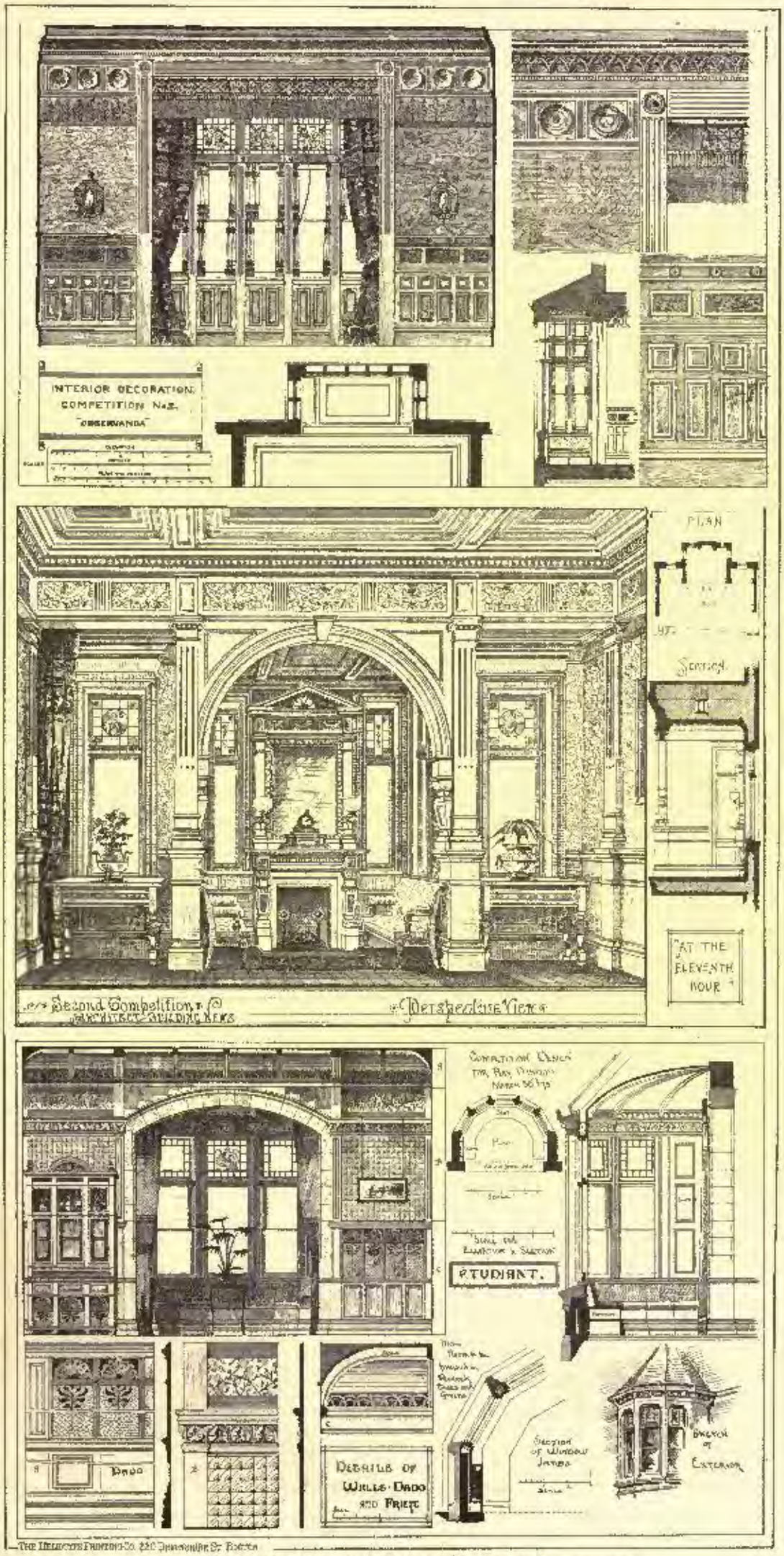
BARN FOR THE CORNELL UNIVERSITY.
WORKMAN'S COTTAGE.
MISS MARGARET HICKS.
DESIGNER.



THE QUADRANGLE, MUIR COLLEGE, ALLAHABAD UNIVERSITY, INDIA
W. EMERSON, ARCHITECT



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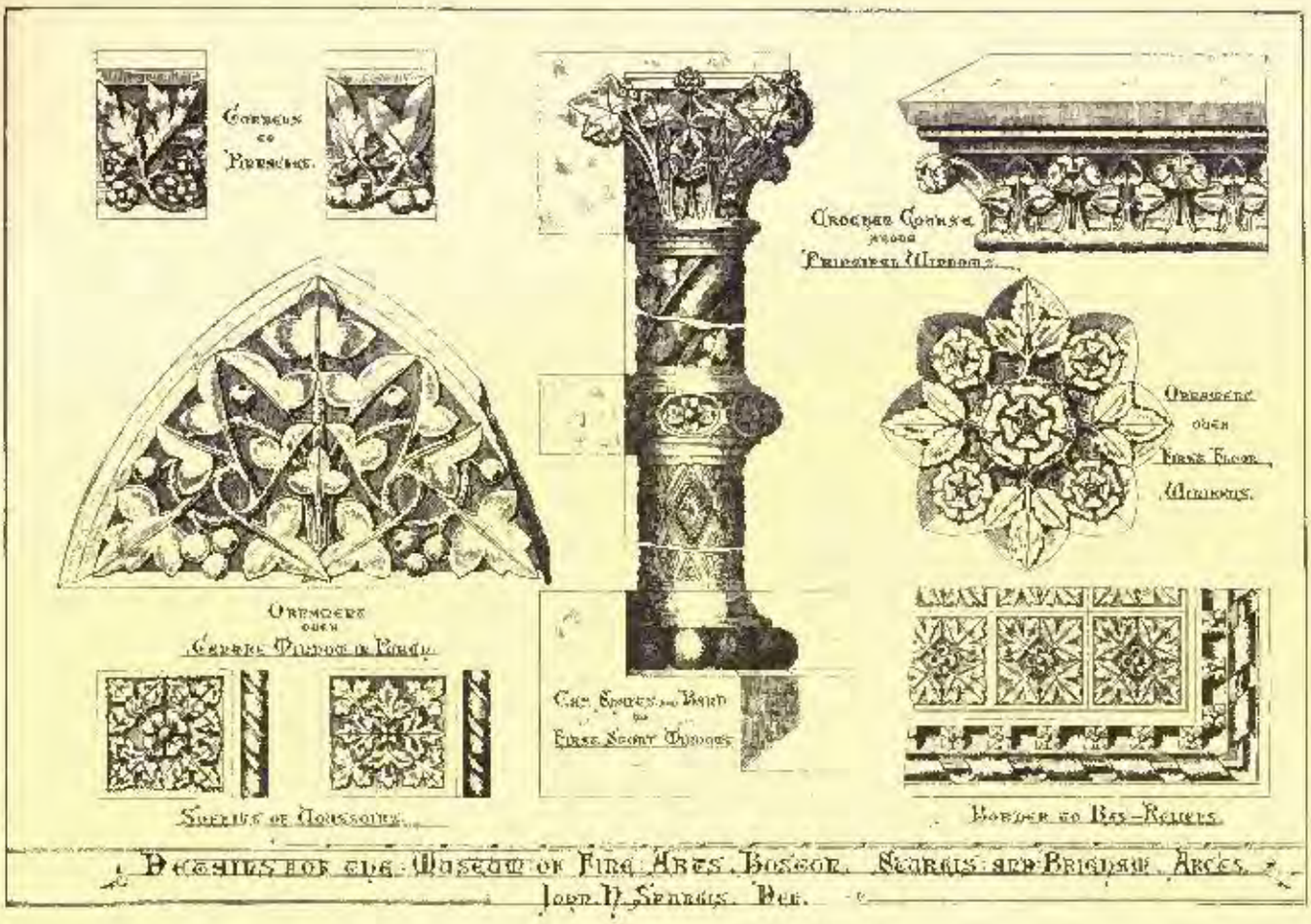
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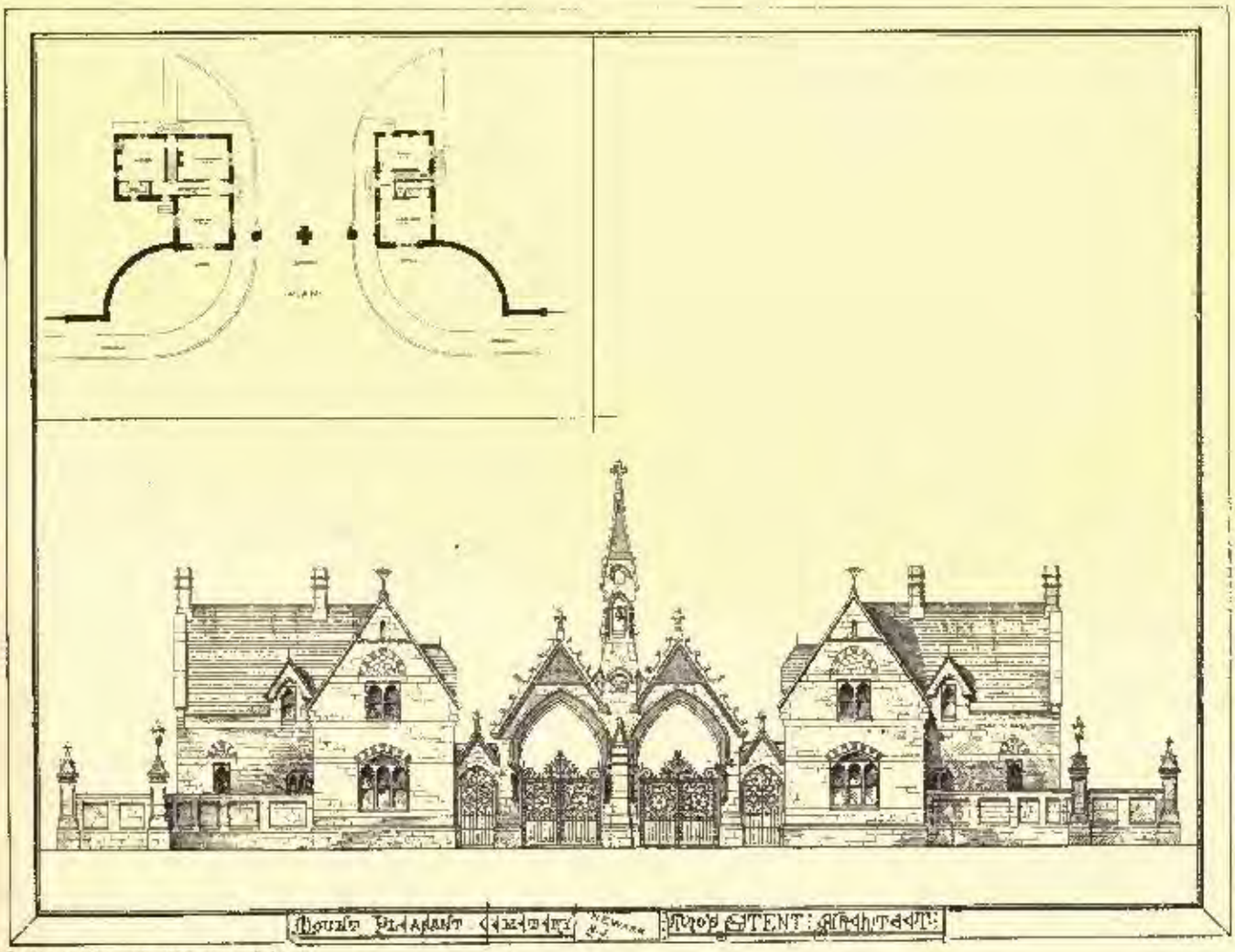

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come to the same thing. If the sum of the diameters, or 105 minutes, gives the principal dimensions of the building when multiplied by 3, 5, 7, and 16, the mean diameter, of course, will produce the same result with 6, 10, 14, and 32. But in this case the minute or sixtieth part of the modulus would have been measured at the middle of the shaft, not at the bottom, and the curious coincidences upon which the conclusions of the essay are based would disappear or give place to others. For, as the Pythagoreans also imputed mystical properties to 1, 2, 4, 8, 9, 18, and 27, as well as to 3, 5, 7, and 35, almost any dimensions, however measured, would invite similar investigation, and would seem to promise a like reward.

The suggestion, nevertheless, that the simple numerical relations, which in some form or other are generally supposed to have controlled the proportions of the Greek temples, were dictated by a mystical scientific philosophy, seems to us one of great value. Accepting the doctrine that, as Mr. Watkins Lloyd has it, "the Greek architects attached great value to simple ratios of low, natural numbers," writers upon the subject of proportion have generally taken it for granted that there was some æsthetic quality in these relations which gave them importance. As much zeal and patience has indeed been spent in trying to recover the arithmetical or geometrical canons by which the Greeks achieved their mastery of form as in the search for Captain Kidd's treasure, and with about as much result. Mr. Norton keeps clear of all such nonsense, and his suggestion that these subtleties, so far as they existed at all, lay outside of the domain of art altogether must greatly commend itself to artists of every sort, and especially to architects. For none know so well as the designers of buildings how much effect small differences make in one place, and how little change is produced by considerable differences in another; how vastly, in fact, the effect of masses is controlled by the treatment of details. The notion that fixed arithmetical proportions will make the beauty of his work is to the architect a stumbling-block and foolishness; and he will easily believe that they can be dictated by any external considerations whatever, and yet not have power to mar it.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

April 5, 1878.

THE Boston Society of Architects met as usual in the Architectural Library of the Institute of Technology, the president, Mr. Cabot, in the chair.

Mr. Longfellow read a paper on the "Qualifying of Architects," in which was urged the importance of having some standard of professional attainment established, in the interests not so much of the profession as of the public. An informal discussion ensued, in which Messrs. Cabot, Clarke, Cummings, Longfellow, Preston, Sears, and Ware, took part, the main object of which was to discover what precedents were afforded by legislation, or by the action of professional bodies, here or abroad, that would throw light upon the questions raised in the paper.

A vote of thanks being moved it was voted, in addition, that Mr. Longfellow be requested to publish his paper in the *American Architect*, and that a committee be appointed, of which he should be chairman, to further consider the subject and report at a subsequent meeting. The chair appointed him with Messrs. Preston and Sears, to constitute this committee, with power to add to their number. It was understood that they were to obtain information in regard to the questions of fact that had been raised, and if practicable to suggest a scheme of action.

Mr. Sears then introduced the subject of surveyors' quantities, calling attention to the great practical inconvenience of having no uniform and well-established system of measuring work. After some general conversation on this topic the meeting adjourned.

THE ILLUSTRATIONS.

MUIR COLLEGE, ALLAHABAD, INDIA. MR. WILLIAM EMERSON, ARCHITECT.

THIS illustration, which is copied from the *Building News*, shows one corner of the college now building. This college is intended to form part of the University of Allahabad, where the native Mohammedans are to obtain a higher education. The building is designed in an admixture of Cairene and Indian Mohammedan styles. At present only two sides of the quadrangle are building. The large domed building on the left is the convocation hall, named after H. H. the Maharajah of Vizianagram, who contributed £10,000 towards the work. The open staircase leads to the public gallery. The tower, which is to be one hundred and eighty-three feet high, will contain a peal of bells. The low buildings on the right are the lecture-rooms with open verandas on either side, which the intense heat of the climate render necessary. The stone used in construction is whitish, and is nearly as fine grained as marble.

BARN FOR CORNELL UNIVERSITY. MR. F. A. WRIGHT, ARCHITECT.

DESIGN FOR A WORKMAN'S COTTAGE. BY MISS MARGARET HICKS.

This design was prepared by the only female student in the architectural class at Cornell University.

DETAILS OF THE MUSEUM OF FINE ARTS, BOSTON, MASS. MESSRS. STURGIS AND BRIGHAM, ARCHITECTS.

This drawing is one of the series prepared by the "Portfolio Club" of Boston.

ENTRANCE TO MOUNT PLEASANT CEMETERY, NEWARK, N. J. MR. THOMAS STENT, ARCHITECT.

This gateway and the buildings connected are built with brown stone, from the Belleville quarries. The whole is set back forty feet from the avenue, has nearly two hundred feet frontage, and offers a fine approach to the cemetery. On one side is the keeper's residence, on the other are the company's offices and reception-rooms for the public.

DESIGNS FOR THE INTERIOR OF A BAY-WINDOW. — COMPETITION NO. II.

PAINTING AND SCULPTURE AT THE CENTENNIAL.

VII.

[The report of Mr. John F. Weir in behalf of Group XXVII., embracing Plastic and Graphic Art.]

CONCLUSION.

REVIEWING the impressions gathered from the art-exhibits of the International Exhibition of 1876, we arrive at certain general conclusions respecting the character of the display.

An exhibition containing so vast a number of works of art (in painting alone the exhibit contained more than five hundred numbers in excess of that of Paris in 1867), and collected from so many sources, must necessarily be far from select, and the first impression, which perhaps outweighs all others, is that derived from the large number of works of but average merit, which, by force of numbers and extent, fill the eye of the observer. This is generally the case with regard to first impressions of art-exhibitions. The more glaring and conspicuous features — the crude, the violent, the bad, and the endless mediocrities that are neither good nor bad — carry the day. It is only by degrees and after the subsidence of these first impressions that works of real merit quietly and unassumingly assert themselves, and the garish, the meretricious, and the false sink to their proper level or remain thereafter unnoticed. It is then that a more deliberate and just impression is formed. If we were to accept the first impression as the true one we should perhaps pronounce the art-exhibit at Philadelphia a disappointing one. But first impressions are rarely based on critical estimates: the feelings, rather than the judgment, find exercise, and, for the most part, are affected by superficial considerations. When, therefore, we reflect upon the large number of really excellent works of art distributed through the galleries, and when we consider the fact that a majority of the most distinguished living artists contributed representative examples of their work, such sweeping estimates are out of place. In some instances, it is true, this representation was very incomplete, but in general it was a fair one and in many cases admirable and select. When we consider, also, how many elements are to be combined, and the large number of interests that are to be consulted, in forming an art-exhibit on so vast a scale, it could hardly be expected that it would have that unity and completeness which a single wise and vigorous direction might possibly effect.

It is a fashion in criticism to decry all art that has not the sanction of time or of established reputation to commend it, and it is a common platitude to apply standards of estimate that prevail in certain schools or in a by-gone age as the only true and immutable estimates of merit. But art is by its very nature pliant and expressive, and as language undergoes continual change and modification with the necessities or conditions that mould and fashion it, so art is likewise subject to these conditions and the time of which it is a voice or expression. It is easy to discern the dominant tendencies of the art of the various nations gathered in this vast exhibition, and these tendencies have been briefly commented upon in the preceding review. It only remains to determine the more general and prevalent characteristics of modern art as manifested in the art-exhibit as a whole. The influence of large and oft-recurring exhibitions is a question worthy of some attention. It is always noticeable that the exhibitions — as in the annual Paris *Salon* — engender products that are not always conducive to the promotion of a correct taste: the clever, the spectacular, and the meretricious often fill a conspicuous place and are held requisite to attract attention. The prominence thus accorded violence and exaggeration is doubtless injurious to the true interests of art, the genuine qualities of which, though lasting, profound, and sincere, are not well adapted to the conditions of such an arena. The artist, therefore, is tempted aside from his better aims to attain the rewards of popular success; and this is so far true that it is a very general custom for artists, particularly the younger members of the profession, to seclude themselves for a few months previous to the opening of the annual *Salon*, while at work upon their pictures for the exhibition. In other words, the picture is painted for the *Salon*, and the motive is that it shall command attention in this questionable competition. This leads to that prominence accorded technical cleverness, and often reduces the products of art to the level of objects of commerce competing in a common market. It would certainly promote the true interests of art if these exhibitions occurred less frequently, allowing time for more mature

and thoughtful work. It is to those alone who are strong enough to resist and ignore this influence that we are indebted for the advancement of art in a true direction, and they compose the very exceptional and leading few whose work has permanent value.

The question of awards is also one that is subject to great diversities of view. Are the elements for comparison of sufficient exactness to allow of just and conclusive discrimination? In the case of mechanical industries and instruments of precision it is possible to set one merit over against another and compare definitely the results. But fine art is an intellectual product, a matter of truth of expression as well as of technical skill; and within any one branch of art questions of preference or comparative merit may arise that are incapable of this arbitrary method of solution. The elements for comparison being wanting, the judgment not infrequently rests upon individual tastes or caprice. It is idle to ignore questions of a higher kind and reduce this competition in art to mere matters of technical skill; and, on the other hand, the subject, though unskillfully rendered, may receive unwarranted preference. A balance of estimates, therefore, is impossible under the circumstances, and it is becoming very generally recognized that the conferring of awards in the fine arts is altogether unsatisfactory because not always properly discriminative. It has but little importance or significance with those who really understand art, and it is not infrequently promotive of false and meretricious estimates. The true verdict in such matters is not always that accorded by juries of award, but that rendered by an intelligent and discriminating public.

The total number of awards conferred in painting and sculpture at the Exposition of 1867, at Paris, was one hundred and three, while at the Vienna International Exhibition of 1873 the total number awarded in these departments of art was seven hundred and eighty-seven. At Philadelphia the total number of awards in the same class was two hundred and sixty-five. At Paris the number of pictures exhibited was 2,004; at Philadelphia the number was 2,971. The following table will show the distribution of awards in painting and sculpture; —

NUMBER OF AWARDS ADJUDGED.

Nations.	Painting.	Sculpture.	Total.
England	29	—	29
France	37	12	49
Germany	24	2	24
Austria	14	1	15
Belgium	16	4	20
Netherlands	27	—	27
Spain	10	2	12
Italy	12	16	28
Sweden	2	—	2
Norway	3	—	3
Russia	6	—	6
Canada	1	—	1
Brazil	1	—	1
Mexico	2	1	3
United States	47	5	46
Total	222	43	235

It has been the aim, in this report, to select those works that seemed specially worthy of comment, for the purpose of analyzing the character of the exhibits of the various nations, and in order to form some reasonable estimate of the tendencies that are most marked in the fine arts at the present time, as well as to form a proper critical review of the Art Department of the International Exhibition of 1876. This task has been, in some respects, a difficult one to execute; but the endeavor has been to render it free from personal bias, and if the estimates are not altogether accurate it is not from any lack of strict judicial purpose on the part of the author.

DISPUTED POINTS IN HOUSE-DRAINAGE.

1. Mr. Bayles's criticism, on page 103, of our recommendation to trap the soil-pipe (outside of the foundation wall) would be a good one if the public sewer were properly constructed, and if every other house had its soil-pipe in untrapped connection with it. But it is not desirable that one house out of a hundred should furnish ventilation to a sewer which ninety-nine other houses are helping to foul. We want a circulation through the soil-pipe, but we should prefer to take our supply from the open air rather than from a foul and imperfectly ventilated sewer, — such as we had under consideration.

A water-seal will not prevent the transmission of gases from the sewer, but it will prevent a *current* of sewer air. As to the blowing out "through fixtures, into living and sleeping rooms," the plan which we suggested would not have this effect, there being another and easier means of escape.

2. The Emerson ventilator, which we recommend, keeps out ice and snow. If enclosed in coarse wire netting (½ inch mesh) it keeps out birds. A *bend* reduces the practical area of the pipe and retards the movement of air, — up or down.

3. If sewers are properly made, then the recommendation for open man-hole covers and free ventilation through the soil-pipe of each house has, and has had, our fullest indorsement. But we must make the sewers right in the first place.

CORRESPONDENCE.

THE INDIANA STATE HOUSE. — A CURIOUS LEGAL CASE.

Cincinnati, O.

We learn from one of the experts in the Indiana State House competition, that he can see no just grounds for discontent among the disappointed architects, — every one could not be successful. It seems that the award at the competition did not lay with the three experts, as many persons suppose. The experts merely reported to the commissioners simple facts in each set of plans as regards heating, lighting, ventilation, cost, strength, and perhaps a dozen other points; these various reports were made without comment by the experts, and the commissioners were left to draw their own conclusions. In short, the commissioners made the award, and not the experts. It is said further that Mr. May's plans were perhaps the only ones that fully complied with the printed conditions that governed the competition, or at least they came the nearest to the mark.

We paid a visit to the Music Hall building with the view to giving a full description of it, but everything is in such an unfinished state that it would not be fair to offer any criticism at this time for fear of being unjust.

A novel case is now before our courts for settlement. Messrs. Hurlburt and Bell are joint owners at Wood's Theatre, at the corner of Sixth and Vine streets, — each party having a deed to one half the lot upon which the building stands. For some reasons Mr. Hurlburt desires to pull down his half of the building and erect on the site a different kind of a building, and had in fact already engaged an architect for the preparation of the necessary plans; whereupon Mr. Bell, through his attorneys, asks for an injunction to restrain the defendant from tearing down the building. The court granted a temporary restraining order, and the case will come up for final hearing within a week or so. C.

MODERN CHURCH ARCHITECTURE.

Troy, N. Y.

To the Editor of the American Architect:

Dear Sir, — The article, "The Church Architecture that we need," published in your number of January 12th, contains many good points, but it does not elaborate the subject sufficiently to commend itself to the majority of those interested in church building.

English Gothic, especially Decorated Gothic, is a beautiful style, rich, flexible, and perhaps superior to any other for church buildings, and no one can object to its adoption as a basis. The interior arrangement suggested for a church, of a nave, combined with a deep chancel, divided into choir and sanctuary, with its apsidal end, its steps, railing, altar, reredos, rich furnishings and decorations, and its side organ chamber, will readily commend itself to the Episcopalians, but this admirable arrangement fails to meet the wants of the Methodists, Baptists, Presbyterians, and Unitarians, who are largely the church builders, and who need good advice in church-building matters more, perhaps, than do the Episcopalians. What I propose is to suggest an arrangement suited to the services of the denominations named, and I will consider, first, the interior.

The simple proportions of twice the width for the length of an audience-room will answer in small buildings; for larger ones, one and a half times the width for the length is better, and if to this room, or nave, are added transepts of moderate depth, the effect will be improved. These transepts should be deep enough to receive a tier of pews, six feet or eight feet in length, and when so utilized, the result is to bring a large proportion of the audience near to the speaker. To the nave, with its transepts, add a deep recess, chancel or sanctuary, and the plan becomes cruciform. Make the chancel as wide as the nave and deep enough to receive the organ, and to accommodate everything connected with the service. The floor in its front portion should be raised at least three feet above that of the audience room, and should project slightly into the transepts or nave, so that all may see and hear the speaker properly. This floor or pulpit platform should be spacious, and on it should be the pulpit and reading desk, which should be as small as will answer. In front of this elevated floor place a lower platform, raised one step above the floor of the audience room, and make this large enough to accommodate the communion-table and the necessary chairs for those who officiate at the communion-service, — and in Methodist churches, surround this lower platform with a kneeling-step and railing.

Place the organ at the rear of the chancel, and arrange its pipes with care, so as not to obscure the window or windows in the end wall. Make the floor in that portion of the chancel back of the pulpit platform two feet higher than that used by the speaker. Place seats or stalls for the choir on either side of this raised portion of the chancel, and provide seats enough for a large choir; these seats are to face each other; and a wide floor space is to be left between them. Place the keyboard of the organ in line with these seats, and so avoid making the organist conspicuous, and provide seats at the side of the chancel, on the pulpit platform, for the use of the clergy.

In Baptist churches, place the baptistry in the centre of the upper portion of the chancel, in front of the organ, and provide screens on either side, so that candidates can enter and leave the baptistry without being seen by the audience, and the baptistry should be elevated above the choir floor. Entrances to the chancel, at the sides, should be provided for the use of clergy and choir. In

churches where the font is used, place it on the main floor, to the right of the pulpit platform.

With the above arrangement, all the services can be conducted "decently and in order," and can be enjoyed by the audience without any discomfort.

The audience room should have a broad central aisle, two side or wall aisles, a wide space in front of the pews, and a wide vestibule; this latter should extend across the front of the church and should be kept warm in winter weather. If a gallery is added, place it over the vestibule; make it as small as will answer, and provide two stairways leading to it. No galleries should be introduced if they are not needed to accommodate the ordinary congregation. Provide ample entrances at the front of the audience room, and also ample means of exit at the opposite end of the room, which may be used in case of fire or panic. Rooms for the clergy and choir should be placed conveniently near to the chancel.

In the matter of height, great care must be taken. If the height of the room in the centre equals its width, it will be found sufficient. Lofty rooms, having groined ceilings or open timbered roofs, if well designed, are beautiful, but such rooms are difficult to heat in cold weather, and unpleasant acoustically to both speaker and hearers. Flat ceilings for small rooms will not be found objectionable, if properly decorated, and they are, of course, economical. A good form of ceiling is that which rises from the side walls to the centre, leaving the tie beams of the roof trusses exposed. These beams can be chamfered or moulded, and under their ends can be placed hammer-beams and braces, on which a large amount of ornament can be bestowed. The plain surfaces between the beams may be of wood or plaster and can be enriched with ribs, and any amount of color decoration. This form of ceiling, when applied to nave, transepts, and chancel, gives a very rich effect at the intersection, and the chancel portion can receive that superior richness which should be given to it. In beautifying the audience room, all its adornments should be churchly; the style of architecture, the furniture, and the decoration must harmonize. Plastered walls and ceilings will be used in the majority of churches. Tint the walls a pleasing warm color,—use a rich blue for the body of the ceiling and make all applied colored ornamentation "flat work," and avoid the use of all imitation raised work, panels, or recesses, and all imitations of stone-work.

Gilding and bright colors should be used, but not profusely. Introduce under the cornices of the side walls, around and over the chancel arch, in the vestibule, and in other proper places, texts, in richly illuminated letters; let the letters be ornamental, but legible also, and let the texts be, not the Ten Commandments, or those passages which form a basis for the creed, but those which are dearest to the heart of every Christian, the words of Christ, and those which preach continually of God's love and wisdom.

Insert in the walls memorial tablets, in honor of the respected dead and those who were beloved by the church when living, and who are tenderly remembered. Make the windows large enough to give ample light after it is "strained" through colored glass. Let the glass be such as will deprive the light of its glare. Give to the windows beautifully designed emblems, and let them be memorials also, but introduce no stained glass pictures, unless they are those which can claim the perfections of art.

Frescoed pictures and paintings in oil, illustrating the personages and the stories of Scripture, are an appropriate adornment for churches; those are mostly, if worthy, but I hope the time will come when they will be largely introduced, and that our church interiors will be made rich with pictures and with statues, monuments, frescoes, memorials, and all art works of an appropriate character, as are the grand interiors of the churches of Continental Europe, and when they are so enriched they will gain a hold on the affections of the people, which our ill-designed and barren sanctuaries never can. No ornament, enrichment, or work of art, is too good for the church; all that is beautifying, all that will please the senses, and compel reverence, should be used as far as resources will permit.

The pews, chairs, stalls, tables, and all minor furnishings should partake of the general churchly character, and cabinet-makers' articles should be avoided. The furniture and finishings of wood should be of ash, walnut, or some other hard wood, finished with oil or varnish. Painted wood-work soils easily and requires much cleaning and frequent repainting. Pews should be of ample width; not less than two feet eight inches from back to back, the seat fifteen inches high, fourteen inches wide, and the back nineteen inches high with an inclination of five inches; these dimensions will suit most persons.

To ventilate an audience-room, provide a large number of flues in the walls, having registers at the floors; let these flues extend up to the space under the roof, and in this space continue them to openings in the roof near the ridge, covered by small gables; a lighted gas-burner placed at the bottom of each flue will rapidly create a draft, taking the air from the bottom of the room. Fresh air is supplied by the heaters when they are in use. When they are not, or when a supply of outside air is needed, it can be secured by means of openings in the exterior walls at the floor line, and so arranged as not to make the floor objectionably cold. To get rid of the overheated air, place ventilators in the ceiling and roof, controlled by valves and cords.

But church edifices require much besides the audience-room; the chapel or session-house should be placed at the side or rear of the main structure, and connected with its rooms or halls which are on either side of the chancel. If the chapel is made two stories in height, place the Sunday-school room in the upper one, so that its ceiling may extend up into the roof; furnish this room with connecting chairs, which can be arranged in straight lines or curves to suit the classes, and connect with it a library-room, an infant-class room, and two or three others for Bible classes; and provide two stairways, widely separated, leading to the first story. In the first story place the lecture-room and make it no larger than the average attendance requires: connect with it the needed class-rooms, and provide a study, a large and a small parlor, also a kitchen and pantry. Decorate the rooms in the chapel in a manner to harmonize with the church. Make all its rooms cheerful yet churchly. Furnish the parlors with carpets, easy chairs, sofas, pictures, curtains, and everything essential, that will render them inviting and home-like. Ventilate these rooms in the manner suggested for the audience-room.

If the necessities of the site compel the placing of the Sunday-school room and the others referred to in a basement, let this basement be a story of from twelve feet to fifteen feet in height, and have its floor above the ground a step or two. The great objection to such an arrangement is the fact that the audience-room must be reached by long stairways. To help this matter, provide six or eight outside steps at the entrances. Make the vestibule wide and long, and divide the two stairways into two sections each, having broad landings or platforms half way up. All church edifices having a basement should be provided with a "safety-valve," in the shape of a spacious rear stairway, and all doors used by the audiences should open outwards.

The general preference given to Gothic architecture in church buildings seems natural and proper. It is a style which affords an endless wealth of examples, an unlimited field for artistic invention. It suits all forms and situations; it admits of modification, of new detail, of new materials; and so long as its aspiring spirit is not violated, the architect can combine its ancient characteristics with his original work in a manner which will produce happy results.

M. F. Cummings.

THE PERSPECTIVE OF STATUES.

Leavenworth, Kan., April 2, 1878.

To the Editor of the American Architect:

Dear Sir,—Can you tell, me through the columns of the *American Architect*, the rule for ascertaining the height that a statue should be, which is to be placed on a high tower or on any elevated point, to appear the height of an ordinary person to an observer at a short distance from the tower? Hoping to receive an answer, I remain,

Respectfully yours, C. A. Deutsch.

ART WORKMEN.

A retrospect of the progress of art during the past ten years may give us some hope and encouragement that in the future a higher degree of excellence will be attained. There has been some advance made toward the acknowledgment of principles in architecture, and an endeavor to be honest in the expression of our designs, while at the same time faithfully working out in planning and use of materials a perfect adaptation to modern requirements. The taste of the general public has been educated and a healthier tone prevails, greatly attributable to the diffusion of literary works on decoration and household furnishing, and the production of improved designs in furniture, a reaction from the lavish works of the preceding period.

But while we have in these things made some progress, has the workman risen in intelligence and appreciation of art? It would seem in England, at least, in spite of all the incentives there for the encouragement of a true art feeling, the workman remains as much as ever a mechanical tool. Mr. J. P. Seddon, in a recent article to the London *Times*, says: —

"I had told an audience of the same class that art workmen were conspicuous only by absence; that architects had to rack their brains to produce effect by designs capable of being executed by idiots; that it was impossible now to get one leaf well carved, although quantities of carving were being done which looked, to half-shut eyes or at a distance, like old work, but which was not; that the results of that very exhibition showed that time had been spent better than in public-houses, and that some ingenuity of a practical and scientific nature existed; but that as regards art work, whether in point of design or execution, there was nothing there above mediocrity (except a couple of walking-sticks carved by a plasterer named Sable with a pen-knife), and, in fact, nothing artistic to equal what came to us from people in the East whom we choose to think savages. I told them to go to Westminster Abbey Chapter-house, to examine and reverence the leafage of its capitals, and to the Architectural Museum near Dean's-yard to see the casts collected there, and to learn therein how in all parts of the world, at all times, until the last three centuries, men's work had been generally beautiful and true. I trust Canon Farrar's recommendation that such exhibitions should be widely imitated will be carried out, and that art work, for which there is some need, be fostered by them, and that we may cease to have to try to dispense with carvers and to supersede masons by puddlers of Portland cement; or that we should have to go to Japan for good joiner's work and to Belgium for cheap metal and marble work. I have infinite faith in the powers of English workmen if they will only learn to use them, and think that they might, and would, soon again beat the world in craftsmanship, if only they would first beat or leave the unions which have degraded them."

Who has not wished that the workman might be imbued with more understanding and sympathy for art; that he might attain the excellence of the old builders who worked on cathedral and church,

carving there the expression of their power? In the work of the mediæval ages much was left to the individual worker, but now how different! The whole of the work of any building, down to the smallest detail, has to be delineated, and, during execution, constantly supervised, thus entailing enormous labor on the architect. But with workmen who had the proper training and culture this burden would be lightened. Again, the more directly an idea is expressed in building — translated into stone — the more vigorous and effective will it be. The designer of any piece of carved work will execute that work more truly — technical knowledge being equal — than another to whom the working out of the design is given.

Hence, with a wider diffusion of feeling for art among our workmen, the labors of the architect would be lessened, our architecture would become more of a living art, and the general sympathy and appreciation of the public for good work would be greatly increased.

R. R.

NOTES AND CLIPPINGS.

Strike. — Undaunted by the ill-success that has attended the recent strike in London, the masons of New York have now struck for $3.50 per day. Already six hundred masons are said to be out.

Strike. — On April 7th, a strike occurred at the insane asylum now building at Topeka, Kan. The contractor receives pay upon the estimates submitted to the board at their monthly or bi-monthly meeting. The strikers are sub-contractors and men who say they have not been paid as they should be. The grade-men have also struck because they have not been paid. It is said that the non-payments are not the fault of the State or board.

Accidents. — Two accidents of an unusual character have happened during the past week. One at Rochester, N. Y., where an oven used for baking the japanned tin cases of thermometers exploded, destroying the building, killing one person and maiming several others. The other accident was at Buffalo in the same State, where a large vat at the Grape Sugar Works, which contained some fifty tons of wet corn, burst and fell through five stories to the ground, killing one man and wounding others. The vat was a new one and was being tested at the time of the accident. The knowledge that the power exerted by swelling grain is almost irresistible makes ship-owners unwilling to transport cargoes of grain in bulk, because, if the cargo gets wet, the loss of the ship is almost certain. One of the curious uses to which this property of grain is put is the disarticulation of the bones of the skull, which are forced apart by the slow action of the swelling grain so as to injure them as little as is possible.

Accident. — While taking down a frame building in Ottawa, Ill., the roof fell and injured three workmen.

The Philadelphia Water Supply. — Lately the Messrs. Cramp and Sons offered to supply for five years certain portions of Philadelphia with water, receiving pay at the rate per million gallons raised one hundred feet that is now paid by the city, or twice as much per million gals'd two hundred feet. The Messrs. Cramp state that they can build the necessary machinery for $100,000, and with it raise 14,000,000 gallons daily to a height of two hundred feet, at a cost to themselves of $200 per day, which would enable them at the end of five years to turn their plant over to the city and leave them with a balance to their credit.

Archæology in Missouri. — Several crypts or vaults walled in with dressed limestone have been opened recently upon the bluffs of Blackwater River, about two miles from Warrensburg, Mo., in which were found specimens of pottery, stone pipes, and various implements whose use is not known. Twenty-four skulls were taken out at one time, all of which were so fragile as to be difficult of removal. The same is true of the pottery. Upon some of the pottery are unintelligible inscriptions. The vaults so far explored are about ten feet square and six feet high. There are a large number of these mounds on the banks of the Blackwater, at this place, some of them covered with very large trees.

Gas Light at Washington. — It is said that the cost of the gas for lighting the public buildings and Capitol grounds at Washington was last year nearly $92,000, and that the cost of lighting the President's house alone is $10,000 a year.

The Mormon Temple. — It is said that the walls of the Mormon Temple at Salt Lake City are now eighteen feet above the surface of the ground. Work was begun twenty-four years ago, and if the same rate of progress is preserved throughout, the walls, which are to be 120 feet high, will be finished in about 150 years.

A Moving Town. — There seems to be good proof that Virginia City, in Nevada, is slowly moving down hill. Whether this motion is due to the tunnelling and mining operations going on beneath it, whether it is owing to seismic action, or whether it is caused by some other geological movement we cannot say. The facts which indicate the movement are a crack on the western side of the town some eight inches in width, on one side of which the ground is three feet lower than on the other side; a water-main recently uncovered which was found to be telescoped for the length of a foot and was besides this so bent that a portion had to be replaced; and the statement that the International Hotel has moved five inches since it was built.

The Krupp Ironworks. — The *Economist* cites from the report for the year 1877 of the ironworks of Herr Krupp, at Essen, the following figures: Notwithstanding the reduction of the number of workpeople, Krupp still employs 8,500 men in his cast-steel works. The works contain 228 boilers and steam engines, with 11,000 horse-power; 77 steam hammers from 2 to 1,000 cwt. each. In 24 hours the works can produce what would be required for 12 English miles of railway, besides wheels, rails, axles, springs, and also 1,500 shells. In one month 300 cannons can be made in these works. Since 1847, 15,000 cannons have been cast in Krupp's Works. Thirty-six thousand hundred weight of coke and coal are used every day. The conveyance within the works is carried on by railways, extending over 60 kilometres, with 24 engines and 700 cars. Forty-four telegraph stations are within the works, besides a well-regulated body of firemen and 8 steam fire-engines. Near Meppin, Krupp is having an artillery-range prepared for him, which extends over 18 kilometres. In Krupp's mines for iron and coals, 5,300 men besides are at work. He has mines in the north of Spain producing 4,000,000 cwt. of iron metal yearly, which are transported in five steamers belonging to Krupp. The workpeople, with their wives, number 16,200 persons, who live in 3,277 apartments belonging to the firm.

Rugby. — It is intended to build a museum of the fine arts at Rugby, in the interests of that famous public school.

The Douro Bridge. — The Northern Portuguese Railway has lately completed a fine work of engineering skill, which we have already mentioned, in a bridge over the Douro, at a point where its breadth is 140 metres (459 feet), and its depth 18 metres (59 feet). The bed is sand and mud, with a thickness varying from 15 to 56 metres (49 to 183 feet). The river is subject to great and rapid freshets, which sometimes raise the surface 12 or 13 metres (39 to 42 feet) in 24 hours. The railway reached the bank of the stream at a height of 60 metres above the low water level, and at this height the distance between the banks was 350 metres (1,140 feet). The construction of a viaduct, under the circumstances, presented serious difficulties. Plans were presented by four firms, and the one offered by G. Eiffel & Cie., of Paris, was adopted. It was impossible to think of building a pier in the river; it was therefore bridged by a single iron arch, of 160 metres (520 feet) span, a little larger than the central span of the St. Louis bridge. The arch abuts against piers of masonry on each bank; there are two other piers on one side, and one on the other, at distances varying from 29 to 37 metres (94 to 120 feet). The central arch is crescent-shaped, formed by two parabolæ, intersecting at the abutments and having a height of 10 metres (32 feet), at the crown. It is composed of two principals side by side, hinged at the abutments, so as to allow for changes of temperature; at starting they are 15 metres (49 feet) apart, but the distance is reduced to 4 metres (13 feet) at the crown. This arrangement was made in order to secure effective resistance to the violent winds which are frequent in the valley, and all the trellis-work, both of the roadway and of the piers, was planned for the same purpose. The mounting of the arch presented great difficulties, on account of the impossibility of erecting scaffolding, but by the help of steel cables, crossing the river at the level of the platform, the two halves, simultaneously constructed, met at the key with absolute precision. — *Ann. des Ponts et Chaussées.*

The Dresden Theatre. — The size of the stage of the new opera house is said to make it unsuited to the drama.

The Puerto del Sol. — The Puerto del Sol at Madrid is now illuminated by the electric light. The lights are six globes of opal glass in sets of three, on two lamp-posts, which are about twice as tall as those usually used for gas. These six globes were all of equal brilliancy, and emit a soft, penetrating light as steady as an argand burner.

The Eccentricities of Forgetfulness. — The Viennese architects seem to have been peculiarly unhappy in forgetting some of the most common essentials of their buildings. Thus, it is said that at the new Opera-House the heating apparatus and the water closets were forgotten. While at the University the stairs to the observatory tower were forgotten, as well as the janitor's quarters, while the library was so small that a portion of the books had, from the beginning, to be stored in the cellar. It is also said that it was found out after the bell had been hung in the tower of a new church, that the tower was so small that the bell could not be rung.

Manufacturing Cold Air. — Professor Gamgee is exhibiting in California, says the New York *Tribune*, a machine for making air cold, by means of which he hopes to be able to reduce the heat of mines, to keep the holds of vessels at a freezing temperature while conveying fresh meat, to maintain a floor of ice in a skating-rink during the hottest weather, and to perform many similar wonders. An ammonia-machine last summer did such work for a beer-brewery in New Jersey, situated near the line of the Delaware and Lackawanna Railroad. None of these devices use ice in the process of cooling air. In a recent pamphlet by Mr. Robert Briggs on the "Relation of Moisture in Air to Health and Comfort," he shows by a mathematical calculation that the quantity of ice needed to cool an apartment in a hot summer's day to the temperature of spring might be thirty times the quantity of coal needed to heat the apartment on a cold winter's day; even under the most favorable conditions, when the air is so dry that no moisture would have to be removed, the proportion of ice to coal would have to be fifteen to one. Cooling by means of compressed air suddenly allowed to expand would, Mr. Briggs thinks, be far less expensive than the use of ice, but still too costly for ventilating purposes to serve practically in making our houses cool in the summer.

The Flexibility of Freestone. — A piece of freestone 16′ 0″ long, 3′ 6″ wide, and 8″ thick, being raised to its position in the Music Hall at Cincinnati (some 20′ 0″ above the ground) with grappling hooks, showed a clear deflection of 1½ inches.

The Bastille. — At the time of the destruction of the Bastille, it was proposed by M. Palloy, architect, that the memory of the downfall of the execrated building should be perpetuated by sending to each of the districts of France a fragment of its walls. This was done, and in many places these fragments were built into existing buildings, as for instance, into the wall of the church at Clichy, where it has remained until lately, when some repairs made it necessary to remove the fragment to the *mairie*.

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THE complaint of the Architects who competed for the Indiana State Capitol against the Commissioners has been dismissed by the Superior Court of the State. The ruling of the judge was clear and decided. He said that the intention of the legislature to make the Commissioners sole judges of all the plans, specifications, and estimates was too distinct to be doubted, and that they were given entire discretion in the matter. With a discretionary power the court had no right to interfere, unless it could be shown that it had been fraudulently used. Of this no charge had been made against the Commissioners, and the only right to revise their action lay in the legislature that had appointed them. In regard to their treatment of the plans submitted, the duty of the commitee to examine all the plans, and to cause the experts to do so, was imperative, and the examination was to be thorough and critical. But it had not been charged in the complaint that the plans were not examined; and the right to determine for themselves what was a thorough and critical examination was granted, as a necessary incident, with the power to make it. As for the position of the experts, the court said that the Commissioners were bound to call in their assistance, and to cause them to make a thorough examination of all the plans. They unquestionably did call them, and it was not charged that the experts did not examine the plans. But these experts were not empowered to take part in any judgment upon the plans submitted; they were simply to assist and obey the Commissioners. The complaint, that they were not allowed to test the plans according to their own judgment, was irrelevant, because the Commissioners, being superior to them, were empowered to prescribe their method of examination. With the wisdom of the Commissioners' choice the court had nothing to do. It therefore found no reason in the petition to interfere with the proceedings of the Commissioners; and the motion to quash the complaint was sustained.

THIS decision makes it clear that in the opinion of the court the Commissioners were made by the legislature, and were intended to be, supreme and irresponsible, except in the matter of cost, and of one or two purely formal restrictions. The experts, then, were provided only in order that the Commissioners should have the means of informing themselves technically, and getting a duly qualified opinion of the plans, — if they chose. If they only so much as looked at all the plans, and the experts were allowed to look at them also, they have fulfilled their requirements. Whether this was the actual intention of the legislature or not is of little practical importance in the decision. It is enough that it is the legal interpretation of the act, and very possibly the legislature itself did not inquire into its own meaning so closely as this. It is difficult to see under these circumstances what leg the opposing architects can find to stand on before the courts unless they can get the decision reversed. Their sole resource would seem to be to appeal to the legislature, which alone has power to revise the action of the Commissioners, provided it can be got at before the State is irrevocably committed by contract. Nevertheless it is said that the architects have filed an amended complaint which takes its cue from the judge's opinion, and charges that the Commissioners did not order or permit the experts to make a critical examination of the plans. As we understand it, the first complaint entered by Mr. Tobbetts has not, at the time we write, been passed upon.

THE Annual Report of the Boston Inspector of Buildings for 1877 shows a small increase in building over the year before. The number of permits issued was, for buildings of brick, stone, or iron, 265, and for those of wood, 532; the corresponding numbers the year before having been exactly the same for the second, and 200 for the first. The estimated cost of buildings of the two classes finished during the year has been about four and a quarter millions, and one million — against three and a quarter millions and one million and a third in the last report. Very nearly half the buildings in each class are naturally dwellings, while the interruption of work in the business part of the city is indicated by the fact that only twelve are set down as mercantile. The number of cases noted in the fire and accident record is 349, of which practically all but thirty, which are set down as due to a gale of wind, are the results of fire, and the estimated losses are something over one hundred thousand dollars, the whole value of the injured buildings being set at three millions and two thirds, so that the average damage to them was about three per cent of their value. The duties laid upon the inspector and his assistants are not light, as may be seen by reading the memorandum of subjects of which he has jurisdiction that is prefixed to the report. Among the most onerous of them is the examination of buildings with a view to their security. More than twelve thousand such examinations are reported; and detailed reports have been made, it is claimed, on twenty-eight hundred, of which are 36 public halls, 25 public schools, 50 hotels, and 1557 tenement houses. An encouragingly long list is given of alterations that have been made in the various theatres, halls, and churches with a view to the public safety. The report calls attention to one cause which is likely to be a source of some danger in any old and growing city: the fact that, as the business area enlarges, buildings which were first intended for dwellings, and are more or less slightly built, are gradually taken into that area and converted to uses which require greater strength and solidity than those for which they were built, and are therefore liable to become unsafe.

THE project for a ship-canal to divide Cape Cod and shorten the sail from Boston to New York has given Mr. Edmund Redmond, of Rochester, N. Y., an opportunity to bring forward an ingenious project, which we have briefly recorded in one of our late numbers, and whose boldness is startling, even in days so hardened to surprises as ours. He proposes instead of cutting a canal through Cape Cod, or any obstructive strip of land, such as the Isthmus of Panama, to make a portage or carrying-place of it, after the Indian fashion. He would take vessels, of whatever size, out of the water on one side and drag them bodily across the land to launch them on the other again. Since to carry them on a cradle would be difficult and likely to strain the vessels, he proposes to float them in tanks and carry tanks and all by rail. Theoretically, of course a mere film of water would be enough to float a vessel in a receptacle exactly fitted to her shape. Mr. Redmond therefore proposes to adapt his tank as nearly as practicable to the lines of vessels' hulls, so as to float them with a comparatively small additional weight of water. He would make his tank of boiler-iron and run it, mounted on two hundred wheels, over a railroad of several parallel tracks. The track would be carried far enough under water at each end to allow the tank to be submerged like a floating dock, and opened to take in or let out its freight; when the line could not be laid out straight, changes of direction would be made by turn-tables, to avoid the inconvenience of curves. It is hardly safe to say, with the wonders of our day before our eyes, that any mechanical undertaking is impossible, especially when it is merely a question of force and the overcoming of dead weight; but there are some whose difficulty and cost are apparently so out of proportion to their service that we are inclined to quickly dismiss them as impracticable. When we remember the extreme difficulty which Mr. Brunel had a few years ago in

launching the Great Eastern, that is, in moving her empty hull some feet downwards into the water, and then think of Mr. Redmond taking a three thousand ton steamer with all her stores and cargo, or a ship of war and her armament, across Cape Cod, or, as he suggests, the Isthmus, the prospect is not flattering. The only appliance that has yet been found equal to such work is the hydraulic ram; and to drive a vessel up twenty odd miles of steep grade with hydraulic rams is not a task to please the temper of this fast-going generation. We have not seen any estimate of the cost of the tracks and tanks and machinery, nor of the expense of working them. The cost of the Cape Cod Canal, however, has been put down at two million dollars; and one of the United States floating docks, which is a trifle to Mr. Redmond's appliances, has, if we remember rightly, cost a good deal more than this. We fancy, too, that investors who consider how much more expensive it commonly is to transport passengers and freight by rail, even without their ships, than by water, will not be quickly led by hope of profit to embark their capital in a ship-tank railroad.

It is said that the strike of the London stone-masons, which ended a short time ago, after lasting thirty-two weeks, has cost the unions which supported it not less than a hundred and fifty thousand dollars, and has left five hundred of the men out of employment. The cost to the masters of importing and transporting workmen is estimated at fifty thousand dollars. So far as these figures are conclusive, they indicate that the cost of the strike has been three times as great to the men as to the masters; but with them must be included, on the one hand, the difference between what the strikers received from the unions and the wages they would have earned; on the other the loss to the masters by the interruption of their business. When the whole was summed up, if it could be, and personal privation taken into the account, it would undoubtedly be found that the burden was much heavier to the men than to the employers. It has been probably the hardest battle of the kind on record, and has ended in the complete discomfiture of the men, who have gone to work — those that have found work — at the rates against which they struck, nine-pence an hour, and with no reduction of hours. The introduction of foreign workmen brought into the struggle a new weapon, against which the men will hardly be able to prevail until they can construct international unions as compact and efficient as the local ones. The density of population in England and the narrow limits of the Island have been points in favor of the men, giving quick communication and the feeling of nearness which goes far to make union easy and effective. Hereafter the success, and possibly even the occurrence, of strikes that are important enough to compel a powerful combination among masters may come to turn on the capability of the men to form secure combinations which shall extend as far as the masters' aims can reach, and that is over the whole civilized world.

The Committee of the Central Association of Master Builders showed their sense of this aspect of the question in a circular which they issued at the close of the struggle, wherein they urged the importance of retaining and supporting the foreign workmen that had been brought in. They reminded the masters of the boast of the men, that as soon as the strike was over they would oust the new comers. The committee's hope that the result of the war would be to abolish a uniform rate of wages, and promote a perfect freedom of contract between masters and men in the matter of wages, undisturbed by trades-union officers, is perhaps too sanguine; but a great point has been gained, and probably the men will be less aggressive, for a time at least. Nevertheless, it does not appear that the lesson has been greatly taken to heart elsewhere in the kingdom; and we read that the hands in the cotton factories of Lancaster, unmoved by the depression of trade, are preparing a strike on a great scale, in resistance to a reduction of ten per cent. in wages. A meeting of three thousand had been held at Blackburn, at which milder counsels, proposed by their committee, were rejected in favor of an immediate strike. Another meeting on Blakey Moor showed an equally uncompromising temper, and the masters, on their part, were prepared for extreme measures. We read also of a strike in stone quarries at Ballinasloe, in Ireland.

The fact that our Paris correspondent, although writing of the Pavilion of Marsan and the Pavilion of Flora, said nothing about the central group of the Palace of the Tuileries, caused us to wonder whether anything was doing upon the building in accordance with the report submitted some time ago by the Senate's expert committee, MM. Duc, Viollet-le-Duc, and Reynaud. The gist of this report was a recommendation (see *American Architect* for March 3, 1877) to preserve and restore that portion of the building which is, in spite of the protest of M. Charles Blanc, attributed to Philibert Delorme. A late number of the *Pall Mall Gazette* declared, probably to the regret of a great many interested people, that the proposition to turn the central pavilion into a museum had been rejected, and that the whole building was to be pulled down, throwing the ground on which it stood into the Garden of the Tuileries. We now read in *La Semaine des Constructeurs*, that the Municipal Council of Paris has lately expressed a desire that the whole ruin should be cleared away. This desire may have much or little to do with political sentiment; but it is certain that the Tuileries has always been an obnoxious monument to the radicals of Paris, and it is not unlikely that the mass of republicans, predominating in Paris more than in the rest of France, would look kindly on the destruction of a building which is a perpetual symbol of a cast-off but not forgotten monarchy, and a reminder of an imperialism that still hopes for restoration. With this feeling may concur the irrepressible desire of the Parisians for trimness of aspect, and their preference of a smug newness over the most venerable beauty of an older day. But the proposal to destroy the Tuileries has led the Minister of Public Works to declare his ideas in the matter. They are briefly these: The government has studied the situation, and has decided that it is necessary that a central building should exist between the two flanking pavilions of Flora and Marsan. That as a part of the original palace is standing and in comparatively good order, it will be the most economical course to restore it. As the dimensions of such a building would make it unsuitable for the residence of the President of the Republic or for the bureaus of a minister, therefore the destination of the building is not easy to determine. It has been suggested that it should be used as a library or as an ethnographic museum; and M. Viollet-le-Duc has proposed that it should be converted into a winter-garden. As soon as the government has determined to what use to put it a more definite announcement will be made.

THE QUALIFYING OF ARCHITECTS.[1]

The question of the proper qualifying of architects and of affixing some visible mark to them has come up before the profession and the public several times within a few months past. At the time of the convention of the Institute, last fall, it was brought forward by some of the daily papers as a thing of importance to the public safety. President Walter alluded to it in the Annual Address, and the subject was brought up in the convention and referred to its appropriate committee. At the last meeting of the Boston chapter it was made the special subject of discussion, and a special committee was appointed to consider it; we have ourselves more than once called attention to it. There is every reason why something should be done, and without much longer waiting, to fix in the interest of the public some standard of qualification for architects, and to hold them under a stricter obligation than heretofore to do their work well. The profession is more conspicuous in the United States, and its work more important, than ever before. The great increase of building on a large scale, the development of new methods of construction and of new forms of building to meet new wants, the use of new materials under conditions which require special skill and caution, — all call for greater technical acquirement than used to be necessary. The unhappy failures of many important buildings all over the land have, for the moment, made the public alive to the dangers of trusting their work in unskilled hands; and they ought to be a warning to the general body of architects. Those accidents and the feeling which they have called out in the public may give the opportunity for which the more thoughtful part of the profession has long been looking, — of fixing a standard of technical attainment to which whoever will practice as an architect must conform.

Any such attempt may be made with either of two objects, the protection of the profession or the protection of the public. Architects might be protected by forbidding any but architects to do architects' work; the public, by requiring that architects

[1] This article and the one which will follow it are in substance the paper read on the same subject at the last meeting of the Boston Chapter, A. I. A.

should have to do their work well. According as one or the other object predominated, or could be imputed, the movement would wear the aspect of a struggle for privilege, or of an effort for the general welfare. The last aspect would conciliate the support of the public; the other would repel it. The public is jealous of whatever looks like conferring privilege on any class of men, perhaps most of all on any privilege attached to education; so that a measure that looked like the establishment of a monopoly in favor of an educated clique, however useful or reasonable it might be in reality, would be pretty sure of general disfavor.

As a matter of fact it is the interest of the public that is chiefly concerned in making architects what they should be, so far as this can be done; the more, since there will always be quacks and pretenders in every profession, and since even among practitioners of honest intention there is great want of adequate preparation for an architect's work. One fact deserves attention as the peculiar difficulty of our new profession. It is that no standard having ever been fixed in this country for an architect's acquirements the public has no idea of what such a standard should be, and knows no way of determining either whether an architect is what he ought to be, or whether he attempts to be what he ought to be. To do this with certainty by the application of any formula would of course be impracticable. No such criterion as could be established would absolutely meet the difficulty; but if there were a way of fixing a degree of acquirement at which every architect must aim, to be accepted at all, and a preparation which he must at least go through, this would at once rule out the most incapable class, and while the average attainment of the profession was raised, one difficulty of the community would be removed. It is first of all for the general welfare that this is necessary, for it is the money of the community that is wasted and its lives that are endangered, when architects plan bad buildings. It is therefore also important that whatever discrimination can be established should be one that is visible to the public and easy for it to recognize.

Now, in order that an effort to regulate by any formal restrictions the character of our profession should succeed, it needs also the enforcement not of the profession alone, if this could be secured, but of the public. We say if that could be secured, for it is likely that an attempt to establish a distinct qualification for architects would be received quite as coldly by a good many of the profession as by the public: partly because of the indifference of many of them to all concerted action for common interests; partly because there are probably many who, although any restrictions must necessarily be drawn so as to leave undisturbed any who were already in practice, would know by instinct that such restrictions, to have any value, must be a reproach to their own pretensions. These would find it difficult to give a presentable reason for opposing any outside pressure to lift the standard of their profession; but they might feel that in lending their hands to such an attempt on the part of architects they were really writing their own obituaries. It is pretty certain, on the other hand, that unless the people at large saw a reason in their own interest for upholding the restrictions, or at least found them buttressed by the authority of the community rather than by that of the profession, they would simply disregard them, and so make them of no effect. They would employ whomever they pleased, as they do now, without concerning themselves about professional restrictions; the pretenders and the independent practitioners who did not care for professional union would flourish, as they do now, and would snap their fingers at their more orderly brethren. It would probably be altogether ineffective for any body of architects to say, "We will not consider a man an architect, or admit him to our communion, unless he comes prepared within certain requirements." It would require, moreover, a firmness of organization of which, we are sorry to say, we do not believe our profession capable at present.

But if the public can be got to see that it is their own interest — which it is, even more than it is that of the profession — to insist that architects shall not go to work building for them without having learned how, or if this order is enforced upon architects in the name of the public and by the public authority, people will recognize the restriction and be bound by it. To a legal discrimination even quacks must bow, and at least submit to be visibly marked by it, which is all, probably, that we can ask. This is the defence of the other professions, such as are defended, and is the security for itself which the public provides against them. It is the law in most States, we believe, that a man cannot announce himself as a physician and legally collect a fee unless he has an accredited medical diploma. The practice of the law is guarded by the bar itself; but the bar acts in this through the courts, and the courts are the creation of the public, the authority to which the public itself bows, and which executes the law in the case of the other professions. In other countries where there are any qualifying restrictions upon architects, these are the restrictions of the state, and not of the profession.

All the arguments, then, seem to show that the only authority that can be relied on to maintain any standard of admission to the profession is that of the state; and it is to the authority of the state that the appeal should be made if anything is to be accomplished. But an appeal to state authority can be made only on the ground of the public welfare. In most cases where architects have appealed to the public heretofore it has been in their own behalf, to resist encroachment, or to establish some disputed right, or to acquire prerogative. The American Institute of Architects has done a good deal for the profession in various ways, but has had to do it in the face of the distrust that naturally meets such efforts. Architects have had to stand in the unpopular attitude of persons engaged in a struggle for their own advancement; and what they have accomplished has been at the cost of self-seeking. It is very desirable, then, in so important and conspicuous a matter as this, to do nothing which can repel support by suggesting a spirit of trades-unionism, but to make an effort only on the obvious ground of the general good, and not of professional advantage. For this reason it is necessary to be content with those things which can be clearly shown to be for the advantage of the public, and which the public can appreciate. What the things are which in this view might be reasonably insisted on, and by what tests they could be discriminated, are difficult questions, which would lead us a good way, and of which we must leave the consideration for another article.

PAPERS ON PERSPECTIVE.

VII. — PARALLEL PERSPECTIVE. — CHANGE OF SCALE.

THE last paper discussed the case in which the plane of the picture, and consequently the plane of measures parallel to it, is set at *an angle of 45°* with the sides of the object, so that the "vanishing point of 45°," V^{45}, coincided with C, the centre of the picture, and the principal vanishing points of the right hand and left hand lines, V^R and V^L, and their points of distance, D^R and D^L, are symmetrically disposed on each side of it. The other diagonal, at right angles to X, is in this case of course parallel to the picture, and to the Horizon.

126. Let us now consider the analogous case in which the plane of the picture, and consequently the plane of measures, is taken parallel to one of the principal sets of lines, and at right angles to the other. This is illustrated in Plate VI. When objects are thus represented with one side parallel to the picture and the adjacent sides perpendicular to it, they are said to be drawn in Parallel Perspective.

127. The relation between this case and that discussed in the last paper is shown in the two buildings upon the quay on the left hand side of Fig. 20. The nearest one, whose roof rises just above the rail of the descending steps, stands at 45° with the picture, just as in Plate V, having the vanishing points of its main lines at V^R and V^L; while one set of its diagonals, X, as seen in the perspective plan, below, converges at $C_1 = V^{45}$, and the other is parallel to the Horizon; the lines of the hips, P and P', being directed to V^R and V_1', and the hips Q and Q' being parallel to the traces T R N and T L M (105). The points V^R and V^L are off the picture, but V^R suffices to determine the position of these traces. They are not shown in the picture, to avoid confusion.

128. The larger building beyond, like all the other objects in the picture, is drawn in Parallel Perspective. It is set at an angle of forty-five degrees with the building just mentioned, the sides of one being parallel to the diagonal lines that divide the angles of the other, and *vice versa*. This is rendered more obvious by comparing their perspective plans.

129. These plans, it will be noticed, are drawn wherever it is most convenient to put them, that of the further building being taken so very far below the ground as to come lower down on the paper than that of the nearer building.

130. Now it is to be observed that while the planes of the nearer roofs, as in the previous plates, have for their traces the lines T R N, T L M, etc., and the hips have their vanishing points at V^R, $V^{R'}$ etc., the roof of the further building, and the tops of the posts in the foreground, which for convenience are given the same slope, present a new case, which we have not hitherto met, the case of inclined planes whose horizontal element is either parallel or perpendicular to the picture.

131. The several flights of steps also, ascend and descend along inclined planes either at right angles to the picture, or, as is the case of those at either end of the platform in the extreme foreground,

parallel with it. Let us take these flights of steps first, and make the rise of each step six inches and the tread nineteen inches. Now as the flights in the fore-ground are parallel to the picture they will be drawn in their true proportions and will give the true slope of the steps; and if we suppose the plane of measures to coincide with the front of the little pavilion, or with the further end of the steps, we can lay off the steps by scale at once, and ascertain their true slope. It proves to be about 20°.

132. To ascertain the point V_1, which determines the direction of the sloping lines of the flights which ascend at right angles to the picture, we have only to draw a line at $V^x{=}D^x$, making an angle of 20° with the Horizon. Its point of intersection with T P I'', above V^x, will be the point in question, (83). V_1', the vanishing point of the descending flights, will be at an equal distance below V^x.

133. The traces of the inclined planes in which these steps lie, pass of course through the vanishing points of all the lines that lie in them. V_1 and V_1' are the vanishing points of the steepest lines of the ascending and descending planes, their horizontal elements being parallel to the picture, and having their vanishing points at an infinite distance to the right and left. The traces drawn through V_1 and V_1' are accordingly drawn horizontal, or parallel to the Horizon. The trace of a plane is indeed always parallel to that element of the plane which is parallel to the plane of the picture. For distinction's sake we have lettered these two horizons H_1 and H_1', just as the Horizon is lettered H.

134. The trace of the inclined planes of the flights of steps that ascend to the right and go down to the left, on the edges of the picture, passes of course through the point C, the vanishing point of their horizontal element, and is parallel to the steepest line of the slope, which is the element parallel to the picture. This trace is not shown.

135. The traces of the inclined planes of the roof of the building on the left and of the little flat pyramids on top of the posts, are determined in the same way. The slope of these planes is about 25°; they are accordingly steeper than the slope of the steps, and the vanishing points V_2 and V_2', found by drawing lines from V^1 or V^x at an angle of 25°, are further from the Horizon than V_1 and V_1'. H_2 and H_2' are the traces of the front and back planes, while the planes of the right hand and left hand sides pass diagonally across the picture through C at an angle of 25°. They are lettered T M_2 N_2' and T N_2 M_2'. The vanishing points of the hips, or angles of the pyramids, are at the intersections of these traces with H_2 and H_2', at the points marked M_2 N_2 M_2' and N_2'. They are of course in the traces T L Z and T R Z, since these hips and angles obviously lie in vertical planes making 45° with the picture.

136. The only other object in the figure, the pavilion or belvedere, a little building just twice as long within as it is wide, is easily drawn. All the lines of the perspective plan are either parallel to the Horizon or converge to C, which is V^x, and are cut off at the length required by setting off the true length by scale, g', and transferring it to the perspective line by a line drawn to the point of distance $V^x{=}D^x$. The intermediate points are determined in the same way. The front of the building being in the plane of measures, all its parts are drawn to scale, proportionally to their real dimensions, and the same is true of the further end of the building and of the arched wall in the middle, only that being more distant the scale on which they are drawn is smaller. All the arches are struck from the perspective of their centres, which, being in reality all on a horizontal line perpendicular to the picture, occur in the perspective on a line drawn from the centre of the front arch to C. Their exact position on that line is determined on the perspective plan.

In the same way the rafters in the roof may be laid off exactly, two feet apart, using the point of distance $D^c = X\ V^x$ or, if their number is known, the space they occupy may be divided into six equal parts by using the method of triangles, described in the fourth of these papers.

137. For the length indicated in the figure, and with the station point so near the picture, there is no practical inconvenience in thus using V^x or V^c as points of distance. But if, as might easily be, the room to be drawn were twice as long as this, the point g would be inconveniently far away, and if the station point were further from the picture — and it is always an object to have the station point as far away as the point from which the picture will generally be regarded — say two feet, the point V^x also would be practically inaccessible.

138. These inconveniences, which are likely to occur in oblique perspective as well as in parallel perspective, may in all cases be got over by substituting another triangle for the isosceles triangle hitherto employed. Instead of using a triangle whose legs are equal we may equally well employ a scalene triangle, provided only the ratio of the two legs is known. Lines drawn parallel to the base will not now indeed divide the adjacent sides into equal parts, but we can just as easily as before cut off any required dimensions.

139. This is illustrated in Fig. 21, *c*. We have here as in Fig. 12 and Fig. 14 the plane of the picture *p p* in immediate contact with the object, which is here the model of a small room or passage, whose plan, as above, occupies two squares. Let us suppose the spectator to lie at S_2 at a distance from the picture of S_2 C, the length of the Axis X. V^x then, or $D^x{}_1$ will be at an equal distance to the right, as shown, on the prolongation of *p p*. This gives the right angled isosceles triangle S_2 C D^x, and the length of the room laid off on *p p* in the other direction may be transferred to the opposite side of the room by lines drawn parallel to S_2 D^x. Fig. 21, *b*, shows this done in perspective, determining the point *g*, as just now in Fig. 20.

140. But this point *g* will be fixed with equal precision if we take instead of D^x another point D_4 half way from C to D^x and make the base of our triangle $S_2 D_4$. The triangle is no longer isosceles but we know that lines drawn parallel to the base will make the segments of the short side just half as long as those of the long side, and that does just as well. For if we now lay off in the other direction, just as before, half the length desired, a line drawn parallel to S_2 D_4 will give *g*, just as before. And in like manner we might take D_4, halfway between C and D_2, and lay off one quarter the required length of the room, etc., with the same result.

141. Applying this now to Fig. 20, by taking D_4 or D_4, measured off along the Horizon from V^x at half or quarter the distance of the station point from that vanishing point, we can cut off any desired dimensions on the perspective lines that converge at V^x by laying them off upon the ground line, *g'*, by a scale of equal parts half or quarter as large as those used in the plane of measures, and employed for the horizontal and vertical lines in that plane. Instead of using a half inch scale, and using D^x as the point of distance, we may use a quarter inch scale and transfer the dimensions to X by means of D_4, or an eighth scale and use D_2.

142. These results may be summed up as follows: —

Auxiliary points of distance, which may be called points of half-distance, quarter-distance, etc., may be obtained by laying off from the vanishing point of any line, upon any horizon or trace passing through that vanishing point, a half, or a quarter, etc., of the real distance of the station point from that vanishing point; the required dimension must then be laid off in an opposite direction upon a line of half or quarter measures, etc., drawn parallel to that trace through the point where the perspective line in question touches the plane of measures, the scale employed being a scale of equal parts, half, or quarter, as large, etc., as those employed for lines in the plane of measures.

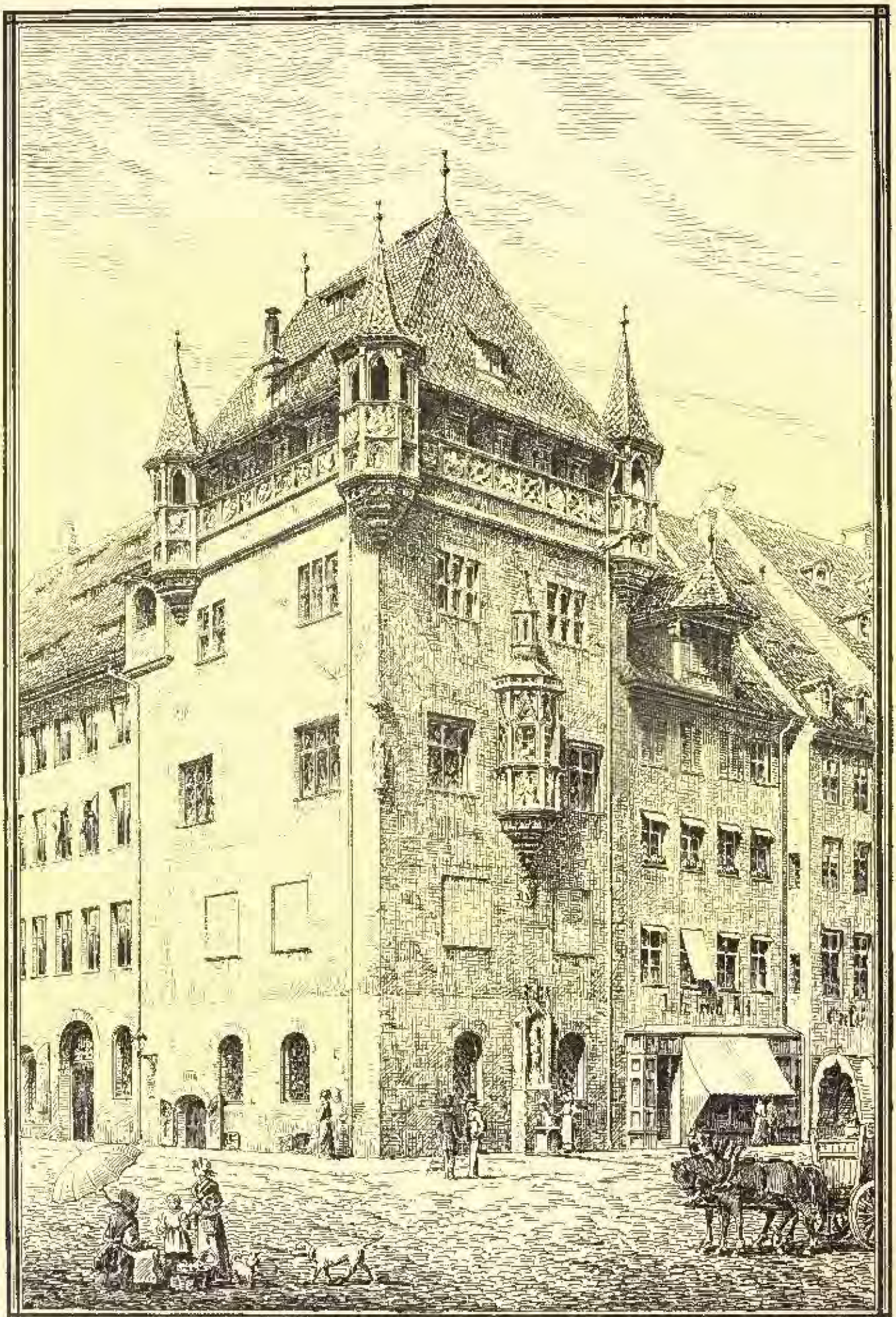
143. It is sometimes convenient also to use a smaller scale for lines parallel to the plane of measures and at some distance behind it, whether vertical, horizontal, or inclined. This is tantamount to establishing another plane of measures, and another ground line, two, three or four times as far off, and diminishing the scale used in the picture accordingly.

144. This use of points of half-distance, third-distance, or quarter-distance, and this employment of an auxiliary plane of measures, and the change of scale involved in both these devices, are obviously just as practicable in other cases as they are in this. But they are most often used in the case of parallel perspective. For in oblique perspective the need of having the vanishing points within convenient distance generally limits the distance of the station point and keeps the points of distance near at hand. Both are always nearer than the remoter vanishing point. But in parallel perspective one of the principal vanishing points is at an infinite distance, and the points of distance, though nearer than that, may yet be quite out of reach. The use of points of half and quarter distance, etc., enables one to set the station point as far away as he pleases. There is absolutely nothing to prevent his taking the point of view most favorable for his purpose, the point of view, namely, that will give the best proportions to his picture.

145. In practice it is most convenient *to assume the desired proportions* at the outset; that is to say, having determined on the scale at which the nearest end of the street or room is to be drawn to make the further end as large, and to set it as far on one side and as far up or down as will look best. Vanishing lines drawn through the corresponding points of the two ends will then determine the centre, C, and the Horizon. This is all that need be determined, since the length of the room or street is supposed to be known of from the near end of the perspective of this length, the real length is laid off upon the ground line, at any convenient scale, and the last point connected with the further end of the perspective line and prolonged until it meets the Horizon, the point thus ascertained will be a point of half, quarter, or third distance, according as the scale chosen is a half, a quarter, or a third of that used in the plane of measures. The corresponding distance of the station point in front of the centre, C, will then be two, three, or four times the distance of the centre from this auxiliary distance point.

The two views of the street in Fig. 22, both of which were drawn in this way, illustrate the importance of carefully proportioning the parts of the picture. The upper shows the street as it would appear quite near at hand, much reduced. The other reduced to the same scale shows how it would look at a greater distance.

146. Inasmuch as the relative size to be given to the two ends of a room, drawn in parallel perspective, or to the two ends of a street, depends thus entirely on the position of the spectator and not at all on the real length of the side, it follows that a long room seen from one point may be drawn to look just like a short room seen from a nearer point, and that there is no knowing which is which. This is illustrated in Fig. 21, where half the room in the upper figure, *a*, as seen from S_2 is just the shape of the whole room in the lower



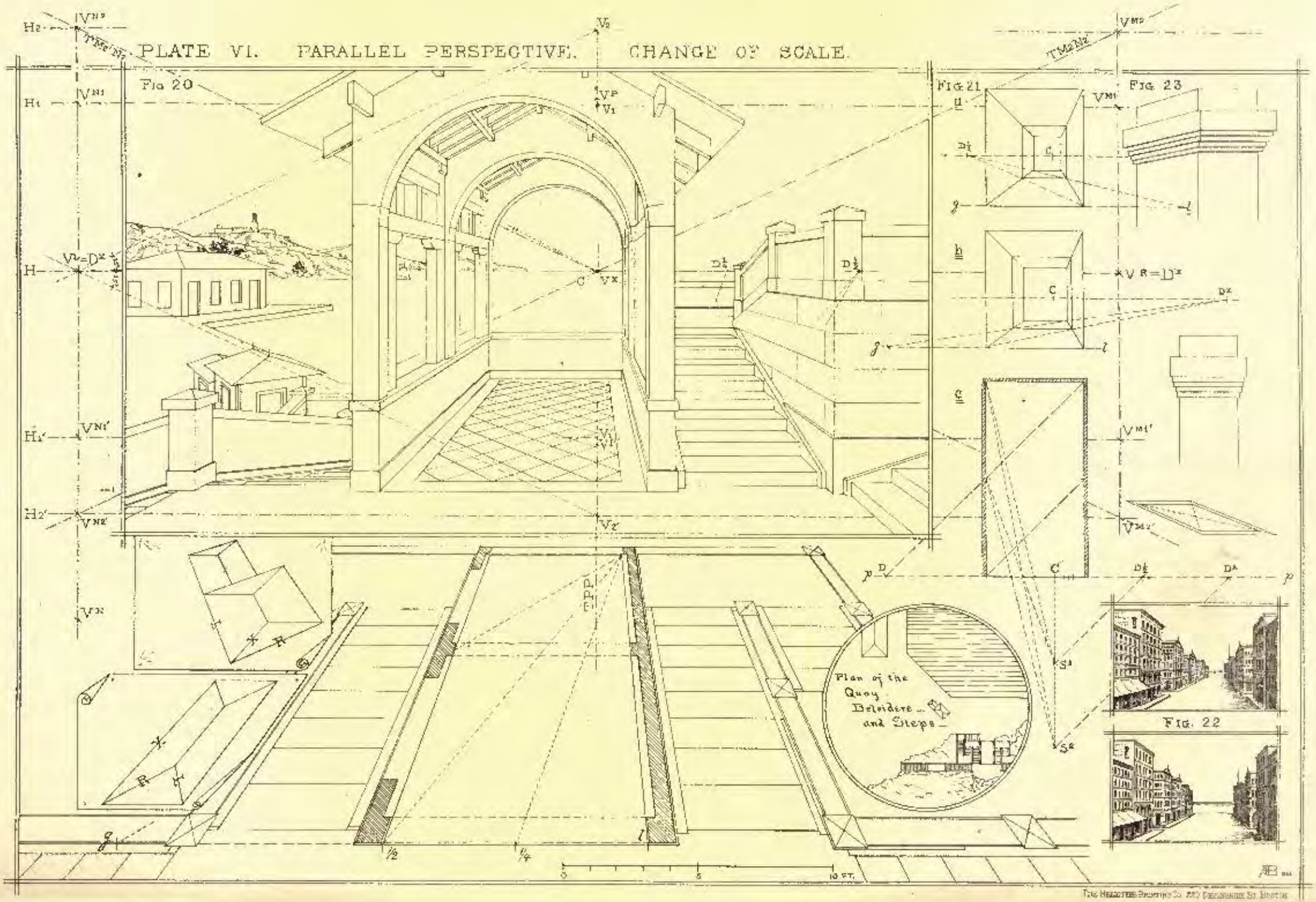
* THE NASSAU HOUSE * NÜRNBERG * BAVARIA * L.S. IPSEN DEL.

DESIGN FOR A FOOT BRIDGE IN A PARK.

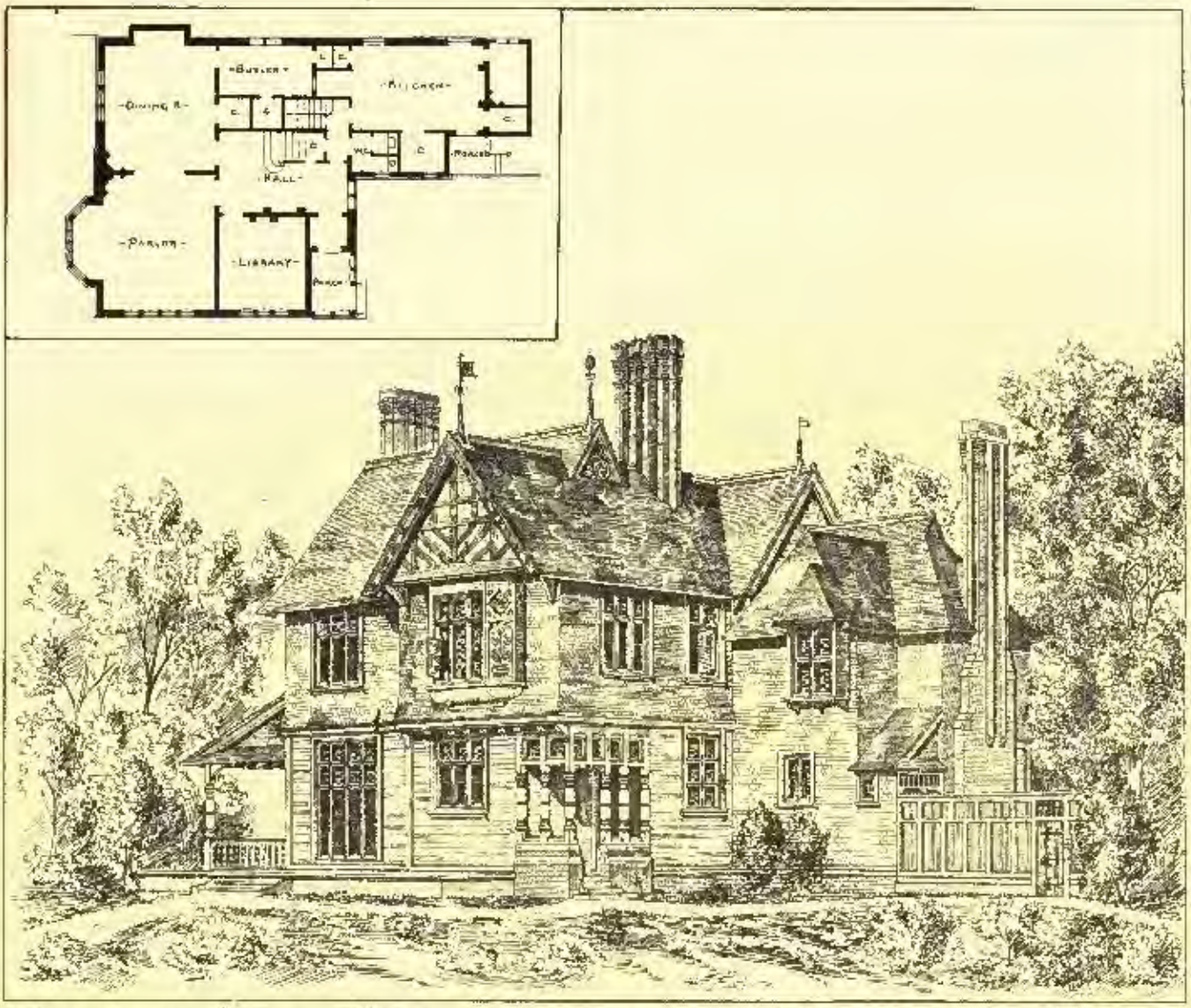
DESIGN FOR BRIDGE AND MONUMENT AT NATIONAL PARK

American Architect and Building News April 20 1878. No 121

PLATE VI. PARALLEL PERSPECTIVE. CHANGE OF SCALE.



The Heliotype Printing Co. 332 Devonshire St. Boston.



Design for a Country House A.E. Barlow, Architect

figure, *b*, as seen from S. The same drawing also, if regarded from different distances, may give the impression of a long street or room or of a short one.

147. In sketching interiors on the spot the point of view is generally excessively near. Such sketches, being viewed from a greater distance, generally give too great an impression of length, and often have to be redrawn, so as to show the room as it would look from a point which really is outside of it.

148. Parallel perspective is not often used for a single object, inasmuch as in order to show a second side, at right angles to the picture, it is necessary to set it a good way from the centre. Fig. 23 shows the top of a chimney, the end of which is parallel to the picture, while the long side is perpendicular to it. The horizontal lines of the brick-work on this side are directed to C, those on the end are parallel to the Horizon, while the vanishing lines of 45°, as seen on the perspective plan below, are directed to V^L and V^R.

149. It is to be noticed that all the surfaces on the end of the chimney are drawn of their true shape and proportion, as if seen in elevation. Still the whole end of the chimney is not drawn in elevation, the relations of the several parts being changed and the symmetry of the whole disturbed, since the nearer surfaces are set further to the right and higher up, and since something is seen of the horizontal surfaces that separate them which in the elevation just below, drawn in orthographic projection, are not seen at all. The chimney certainly looks very ill drawn, and it is not easy even by keeping the eye sedulously at the station point, opposite C, to make it look quite right.

150. The use of parallel perspective is accordingly pretty much confined to cases where two objects are to be shown, one on the right and one on the left, as in street views, or interiors. In these cases the eye naturally takes a central position, opposite the middle of the street or the middle of the room represented. It is not necessary of course that the Axis should be exactly in the middle, and it is generally taken near one side, so as to show as much as possible of the other, and thus prevent an absolute symmetry.

THE ILLUSTRATIONS.

THE NASSAU HOUSE, NUREMBURG, DRAWN BY MR. L. S. IPSEN, ARCHITECT.

DESIGNS FOR FOOT BRIDGES. MR. F. H. BACON AND MR. H. VONNEGUT.

These designs were made by students in the architectural class at the Massachusetts Institute of Technology, Boston, in accordance with the following programme: —

A Bridge in a Park. We suppose that the reservoir by which a large city is supplied with water is situated in a public park, and that it is desired to build across it a foot bridge fifty feet in length, which shall at the same time commemorate the completion of these water-works.

Required. A plan and elevation of the bridge, on a scale of one eighth of an inch to a foot, and details to one half inch to the foot.

PROPOSED HOUSE AT BINGHAMTON, N. Y. MESSRS. HARTWELL AND TILDEN, ARCHITECTS.

DESIGN FOR A COUNTRY HOUSE. MR. A. E. BARLOW, ARCHITECT.

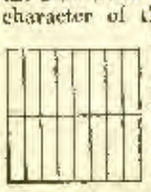
PERSPECTIVE STUDY — PLATE VI.

See the "Paper on Perspective" in this number.

URBAN HOUSING. — II.

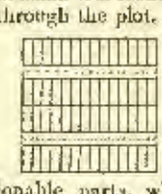
WHAT MAY BE DONE WITH SMALLER LOTS.

As an example of what could be done in the way of avoiding the worst evil of New York tenement houses, let us now consider a single one, or two, of the many plans which would be made possible if we carried out the suggestion, before thrown out, of running through the New York blocks short streets, wide or narrow according to the character of the houses to be placed on them, with a strip of ground on each side of them laid out in small lots.



Let us take a plot of ground of, say, two hundred feet square and lay it out in the usual New York manner. A plot of that size, laid out in 25 × 100 feet lots, will give sixteen lots. If we put one house on each lot we shall have sixteen houses. Each of these sixteen houses can have a frontage of twenty-five feet, and no more.

Let us now take a plot of ground of the same size, and lay it out in small lots fronting on short streets, say twenty feet wide, running through the plot. A plot two hundred feet square, if laid out in lots forty feet deep by a little over fourteen feet wide, will give fifty-six such lots, beside two such short streets. If we put one house on each lot we shall have fifty-six houses. Each of these fifty-six houses will have a frontage of a little over fourteen feet, and no more. But there are houses on the Fifth Avenue of New York, in its most fashionable parts, which have a still smaller frontage, adorned with carved stone fronts, and many stories high, which are, within and without, finished in the most costly manner and fitted up with every possible elegance and luxury for the occupancy of the most fashionable people. I judge therefore that a very comfortable house can be built on a lot which has a frontage of but little over fourteen feet.



Again as to the depth of the lot. Forty feet is a shallow depth for a lot compared with one hundred feet. But a lot one hundred feet deep is, as has already been stated, so large that none but the wealthy can, if the ground is costly, afford to leave a large part of it vacant, nor afford to build so large a house on it as to cover the greater part of it, nor yet to live in such a large house if built. That a very pleasant and fairly commodious house can be built on a lot less than forty feet deep and less than fourteen feet wide, I know by experience. I have lived for nearly a year in Philadelphia in a house on a lot of less size than forty by fourteen feet. One can scarcely be more comfortable than in such a house. It was small, of course, but amply sufficient for my family. It contained a laundry, a kitchen, a small parlor, connected by folding doors with a dining room, and had four good bed-rooms, beside a pantry, a bath-room, closets, etc. There was also a small yard belonging to the house and a rear gate giving access to a side street. The house was in the middle of a block. It was bright and sunny in every part. There are thousands of such houses, not only in Philadelphia but in London, and indeed in most American and English cities and towns, except where their erection is prevented by well-meant, but ill-judged, restrictions on the size of lots and the subdivision of land. Such houses may be situated on wide and pleasant streets or on narrow ones, but yet be without difficulty, all of them sunny, bright, cheerful, wholesome, and uniting the most important factors of good and pleasant, and even of most attractive housing. Why can we not have such houses in New York? Because there are no such lots to build them on. It would not pay to build such houses on lots a hundred feet deep, and there are no others to be had in New York.

If, in the example just given, which is but one of many, such as almost any intelligent reader can construct for himself, we imagine the depth of the houses restricted, so as to leave a free yard space of ten feet in the rear of each house, there would be, where two yards came together back to back in the usual manner, a clear space of twenty feet in the rear between the houses. Taking all the houses on a block together, we should thus have a strip, twenty feet wide, of open space, of the depth of the block [that is, two hundred feet in the case of New York blocks], and open on the ends, for the rear windows of the houses to face on. There are cottages at summer resorts less favorably placed in these respects. Where picture galleries, libraries, dining-rooms and the like have been run out in the rear of some of the finest New York private houses, and in the case of most New York hotels, there is often no such clear space, equally wide, and open at the ends, in the rear of the buildings. The grasping nature of man will always tempt him, nay, will very properly prompt him to make use of all the land on which he is forced to pay taxes and the yearly rental which the interest on the sum it cost him amounts to. But of course, the width in the front of a house left upon as a street, and in the rear left open as a yard or other air space, will vary according to the character of the houses themselves and the class of owners, or tenants, which it is desired to attract to them. When streets or open spaces of twenty feet wide are not wide enough, they may be made considerably wider, and also when divided the houses may be made considerably deeper than in the example just given, and still allow us to have many more houses on a plot of ground of a given size (as for instance on one New York block, if laid out after this method,) than is possible with a system which obliges all the lots to be one hundred feet deep.

The whole subject of the width of streets and size of lots, should be so far allowed to regulate itself, that those who could afford to pay for living on a wide street could do so, and yet live in a wholesome and respectable manner. Now, every one in New York, however small his means, is compelled to live on a wide street. But this compelling, which looks like a beneficence to the poor, and probably was so intended by its authors and promoters, is really a curse to them. As long as the yard spaces in the rear of houses are not kept open by force, in a way which would be neither possible nor desirable, it is for the interest of their owners to make use of them in the only way left to them, namely, to extend the buildings, which must by law front on wide streets, so as to contain as many as possible of the people whom the law compels to live on wide streets. The pressure now put upon landlords and tenants is like the pressure we can put upon an air-cushion. If we put a pressure on one place it must find relief in another. We cannot compel the impossible. We cannot compel people to live in better style than their circumstances make possible. We can compel them to live in a wide street. But if to do so in good style, or even in a fairly wholesome way, is beyond their means, they must do it in a bad style and in a most unwholesome way. Legislation says to the poor man, "You must live on a street at least sixty feet wide, even if, in order to do this, you are compelled to live without windows, light, or air. So legislation, in this case, as in most cases where it attempts to interfere with the laws of trade and the natural adjustments of demand and supply, defeats its own object. The law of the independence of motions teaches us that it is almost impossible to catalogue all the factors which enter into any but the very simplest problems. We see, in the dark, windowless, unventilated chambers, which are the worst feature of the tenement houses, and of too many of the other dwellings of New York, a result of imposing conditions, without purely-

ing all the bearings of a problem. We see that, by not taking into account the poverty of some of its citizens, the limited number of frontages of a certain size in the city, and other factors of a like kind, the result of an action founded on the best intentions is most disastrous. It has developed an evil which is without parallel in the world.

Had there been free trade in real estate, and the possibility of purchasing small lots, to put small houses on, much of the now remaining vacant space on the island on which New York is built, which is paying taxes but yielding no income, would have been long since covered with buildings of moderate cost and have yielded incomes to the owners of land. These buildings would in time, by a natural law of the growth of cities, have made way for finer buildings, just as fast as they were needed. Those owners of land who preferred to hold their land vacant, with the idea that they could so better control the character of improvements, could have done so just as well, without compelling the whole city to do likewise and to be competitors with them in such speculations. But, even if this be not so, if some have made fortunes in a few favored localities, by the New York deep-lot system, which could not have been made without that system, and its attendant but not intended evils, at what a price of suffering, in remoter parts of the city, have those fortunes been made! And, after all, the making of fortunes, in that way, does not benefit the great mass of owners of city land. Such cases, at best, are the exceptions. The great mass of those who make fortunes in land in cities, make fortunes by the rise in value of such land owing to the growth of the population. A real estate system which interferes with the natural growth of population by driving away the most numerous class of land buyers, namely, those of moderate means, and forces them to establish their homes outside the limits of the city, is the enemy of the owners of real estate in that city. The New York real estate system not only does this, but it does more. It not only injures those who have land to sell, by driving away their customers; it not only injures the holders of real estate, by tending, not to put up, but to keep down prices; it not only injures those it drives away, by the time and money and force spent on going and coming from a distance; but, further, it injures those who remain, whether rich or poor, in a variety of ways. The poor it jams together into tenement houses which, in regard to what I have called their worse evil, are, as I have said, without parallel in the civilized world. The rich it eats up with taxes, laid upon the real estate of the city, by the votes of the poor, the citizens who do not own any real estate, and who by the very terms of the New York deep-lot system, never can own any real estate. With an ingenuity that would be sublime if it were intentional, it is so contrived as to keep the number of real estate owners as small as possible in proportion to the number of voters, and the number of those who must pay the taxes as small as possible in proportion to those who impose the taxes, to lay the burden imposed by the many on the shoulders of the few; in fact to keep the owners of property, those who have the greatest interest in protecting it, as few in numbers and (under our system of government) as helpless as possible, in proportion to those who, having no property of their own, are inclined to suppose that they have no interest in protecting property, and yet have votes which control the disposition of property.

WORK ON THE CAPITOL AT ALBANY.

On March 19th the Commissioners for the new Capitol at Albany opened the bids offered for the work to be done in the portion of the building known as the North Centre. As the comparison of such bids is always interesting and instructive, we present those submitted for the most important work at full length: —

CARPENTER WORK.

George Martin, Albany,	$48,900 00
Weller, Brown & Messmer, Buffalo,	49,048 87
Potter & Symms, New York,	49,889 00
Thomas Wilson, New York,	$50,901 00
John Chemishire, Albany,	48,775 00
Herter Bros., New York,	74,810 00
Bryce, McCann & Co., Albany,	75,825 85

The sums of $8,200 and $912.12 to be deducted from Weller, Brown & Messmer's bid, and $5,650 from that of Bryce, McCann & Co., for carving, which may not be required.

GAS-FITTING.

Walworth Manufacturing Co., Boston,	$975 00
Pierce, Butler & Pierce, Syracuse,	1,713 00
G. H. Ritchen & Co., New York,	2,700 00
Shields Bros., Albany,	4,900 00
J. McCann, Albany,	5,060 00
E. H. Cook & Co., Elmira,	6,235 00
E. H. Cook & Co., Elmira,	$72,128 16
Gillies & Geoghegan, New York,	31,840 00
Felix Campbell, New York,	47,500 00
G. H. Ritchen & Co., New York,	59,000 00

PLUMBING.

Pierce, Butler & Pierce, Syracuse,	7,974 00
Philip O'Brien, Albany,	10,815 00
Brandon & Bros., Albany,	11,128 00
John Flanagan, New York,	11,840 00
M. Debebanty & Son, Albany,	12,965 00
J. McCann, Albany,	14,900 00
E. H. Cook & Co., Elmira,	15,488 22
Ridgway & Russ, Albany,	15,600 00
Henderson & Bacy, New York,	16,476 00
P. McDermold, New York,	19,445 00

STEAM HEATING.

F. Tudor & Co., Boston,	$23,441 83
Baker, Mitchell & Co., New York,	26,000 00
Walworth Manufacturing Co., Boston,	26,879 00
W. H. Warner, Brooklyn,	28,884 00

SANDSTONE.

Sinclair & Miller,	$275,508 10

MEDINA SANDSTONE FOR STAIRS.

Sinclair & Miller,	$43,210 00

IRON WORK.

Sullivan & Rice, Albany,	$6,588 00
For window-frames and sashes (per window),	110 00
Hennelman, Hoven & Co., New York,	20,750 00
Mohawk & Hudson Manufacturing Co., Waterford: Roof part,	14,000 00
Windows, 2 at $20 each, $40	
" 3 at $55 each, $165	
" 48 at $70 each, $3,360	
" 7 at $75 each, $525	
" 2 at $125 each, $250	
" 6 at $140 each, $840	
Making a total for windows,	5,750 00

The Board then went into executive session, and on opening the doors announced the following as the awards: —

GAS-FITTING.

Walworth Manufacturing Co., Boston,	$1,719 00

HEATING.

Frederick Tudor, Boston,	$20,441 83

IRON WORK.

Sullivan & Rice, Albany,	$10,746 00

CORRESPONDENCE.

A BOWERY THEATRE. — A NEW OFFICE-BUILDING.

New York, .

Mr. Henry Dudley, architect, has prepared the designs for a new variety theatre on the Bowery, near Broome Street, with a frontage of fifty feet and a depth of one hundred. A desire for show and cheapness has led to a great, startling cornice of sheet metal work, while in other respects the front is bald. The theatre being a cheap, East-side affair, a bar-room is a prominent feature, and occupies the main place on the first floor. Back of this is the auditorium, while above, the gallery runs back over the bar-room to the front wall. The building is not very high, so the narrow and broken stairs used for reaching the upper stories are after all not such a great point of complaint. The cost of the building will be about $20,000.

Two competitions are now closely watched by the architects of this city. The most important is that for the "Borcel Building," to stand on the site of the old City Hotel, 113 to 119 Broadway, facing the great Equitable Building. The property is owned by a lady indirectly connected with the Astor family, Mrs. Borcel, now in Europe. The present office-building on the site is very much out of repair, the walls being far out of plumb. On May 1st, the work of demolition will begin. For the new building plans were invited from Mr. George B. Post, Mr. Charles F. McKim, and Mr. S. W. Hatch. The block, which is about one hundred feet square, is to be covered with a great office-building in brick, fire-proof in material and construction. The drawings were prepared and sent for Mrs. Borcel's inspection to Europe, and this week a telegram was received saying to Mr. Charles E. Butler, the agent: "Prefer Mr. Hatch's plan, but use your own discretion." With the matter still undecided, it would be premature to speak of the merits of the submitted designs. It is a little peculiar that Mr. Post's building, which was designed in masses of Croton or Colabergh brick, with terra-cotta finish, and is six stories in height, was to cost $300,000, while the design of Mr. Hatch, in Philadelphia brick, and with an additional story, is fixed at a cost of $250,000.

In the matter of the Long Island Historical Society building, Mr. Post is pulling in his new design certain features of his old one, with a number of suggestions from the building committee, and in compliance with their demand for a symmetrical structure is losing the spirit of his original design. W.

TOO PROMINENT.

New York, *April* 8, 1878.

To the Editor of the American Architect:

Sir, — Permit a layman to offer a few remarks on a sentence in the description, in your last number, of Mr. Upjohn's Trinity Parish School (see under head of "The Illustrations"):

"It is rare, in this country, that we see so prominent examples of the three styles [of Gothic] at one glance, one might say."

My daily approach to New York via the North River has led me to observe and to study the effect of the juxtaposition of the tower of the school and the tower of the church. This is sometimes so complete that the two combine in one mass; and on a summer's morning I have seen the slate roof of the school tower so reflect the sun's rays as to create the illusion of a vast hole in the tower of the church. Coming down stream, the former begins to disengage itself, at first appearing as a sort of buttress, then as a pure excrescence, next as a smaller outlying member of the church, and finally as a detached and independent structure, with a value of its own in the irregular sky line of the city.

I speak merely as a lover of the picturesque when I say that the two towers nowhere, to my taste, "compose" well together; and as I am not able to contend that the two styles of Gothic are perforce inharmonious, I fall back on surer ground and suggest that not only does the school tower fail to impart grandeur to the church tower by contrast (rising, as it does, to the not insignificant height of the base of the spire), but it disturbs that placid horizontal or gently declining line of roofs which extends from the Mons Equitable to the Battery. It is out of this as out of a plain that Trinity Church tower and spire rise with a majesty incontestably heightened by the absence near them of vertical lines of any description, save this same school tower.

In my view, therefore, Mr. Upjohn's later Gothic belittles his earlier and (as a monument to himself) vastly more important work. That this interference ever occurred to him, I doubt, and I suppose there are few architects whose regard for the sky-line extends beyond the particular building they are engaged upon. Respect for the characteristic outline of a city, therefore, would be an unheard-of sentimentality; but I would ask any Bostonian thirty years old whether he would not be glad to hear that a September gale had blown down that Somerset Street spire which has so long spoiled the

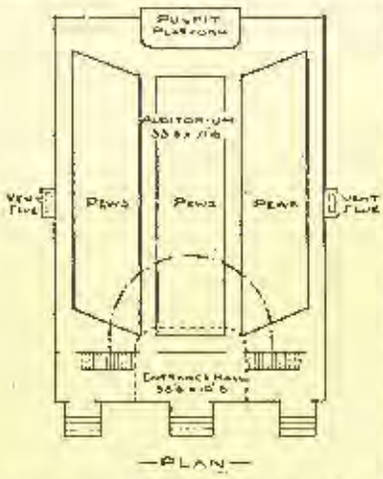
climax of the State House, whose dome, from one point of view, it transfixes like William Tell's apple, and, from another, hugs with the air of a sentry's musket. Exul.

A PROBLEM IN ACOUSTICS.

St. Catharines, Ont., Canada, *April* 3, 1878.

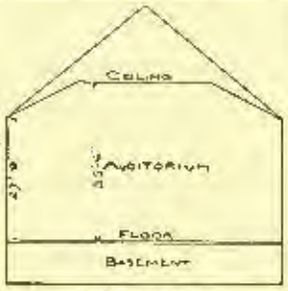
To the Editors of the American Architect:

Dear Sirs, — Some three months ago a church was completed in this city, the acoustics of which require remedying. The voice of the speaker on the pulpit platform is not heard distinctly by those occupying the centre pews from entrance doors, and to a distance of ten feet from same, this not being the case in the side pews immediately adjoining. I herewith send you a sketch and description of the church, hoping you can suggest a remedy; if so, will you kindly inform me, either privately or in the *American Architect*. I noticed somewhere of the acoustics of a hall being made all right by stretching wires. I looked through all my numbers of the *American Architect* from the commencement, thinking I had noticed it there, but without success. Should you recommend this wire method to be tried, will you kindly state whether to stretch the wires longitudinally or transversely and what distance to place them apart; also the height from the floor.



Any other method you may suggest to meet the difficulty give description of carrying it into effect. I have thought that the method of heating the church has something to do with the defect in hearing. It is heated by steam, having a coil whole length of pew under each seat. The air getting rapidly heated causes a continual upward current, which may interfere with the "sound wave." The weather being cold the church has never been tried without the steam being on. There are ventilators at floor and ceiling leading into ventilating flues situated about the centre of side walls. There are no side galleries; gallery for choir over two thirds of entrance hall, projecting into church about three feet. The pulpit platform is raised about three feet four inches above floor line; floor gradually rises from platform to entrance twenty-two inches. A reply to above inquiry, suggesting a remedy, will confer a favor on

Your obedient servant, W. B. A.



[We print our correspondent's letter that he may have the benefit of suggestions from those of our readers who may be ready to offer them. It is, however, difficult to give any confident answer to his inquiry without knowing just what trouble he wishes to overcome, and what parts of his church it affects, as well as the exact shape and treatment of his ceilings and walls.

The common difficulty is either an echo, or a reverberation, which is a confusion of echoes. These are produced by the reflection of sound from the flat resonant surfaces of floors, walls, or ceilings. The usual ways of getting over them are breaking up these surfaces by pilasters, deep ribs, open timbered roofs, galleries, etc., which destroy and confuse the waves of sound so as to prevent their reflection; or by covering with non-resonant material, such as cloth hangings to absorb the sound; or by stretching a series of wires across the rooms, which serve, in a less degree, the same purpose as breaking up the surfaces. The first thing to do in any case is to determine, if possible, by experiment from which of the surfaces the reverberation comes, and apply the remedies to those. If from the ceiling, wires may be stretched horizontally, theoretically the closer the better, practically say six or eight inches apart; if from the walls, the wires would have to be vertically in front of them, and would probably be in the way, so that hangings would be better; if from the floor, carpeting is the natural remedy. — Eds. Am. Architect.]

THE INDIANA STATE HOUSE.

Indianapolis, *April* 7, 1878.

To the Editor of the American Architect:

Dear Sir, — The writ of mandate instituted by A. J. York, one of the State House competitors, against the State House Commissioners to restrain them from consummating their contract with Edwin May, and to call for a reconsideration of the plans, was decided in favor of the defendants. This will, perhaps, stop further proceedings by the dissatisfied architects. The public opinion has not changed in reference to the unwise selection, and the Commissioners will find they will have to work against the judgment of those who are best able to judge of such matters, and a strong current of public opinion. Mr. May has accepted two per cent. as compensation for full services. *

MODERN CHURCH ARCHITECTURE.

Boston, *April* 13, 1878.

To the Editor of the Architect:

Dear Sir, — The communication from Troy, N. Y., printed in to-day's number, under the heading, "Modern Church Architecture," contains suggestions evidently derived from experience and of consequent value, though given in a sweeping tone of instruction. It is not desirable to open abstract discussions as to whether the American sectarian meeting-house is best planned with transepts, whether organist and choir are to be accommodated in a chancel, or whether the central height of the auditory will be adequate if made equal to its breadth. It is the manner in which the item of "style" is decided to which I would call attention.

"No one can object to the adoption of English Gothic, especially Decorated Gothic, as a basis," writes Mr. Cummings. "It is hardly to be presumed that in the selection of the true style to form a basis for our church architecture many will seriously maintain that we have a choice other than English Gothic," writes Mr. Littell, in an earlier number quoted.

Well might the builders of those truthful monuments of the fourteenth century have inscribed upon their walls: *Architecture is finished, henceforth be content to copy.* Every true style has been developed according to the exactions of climate and customs of the land which produced it; in every true building we note the development of plan from the requirements which it was to fulfill, according to the builder's manner of thought; its façades are exponents of the interior, and its details are expressive of their functions. The requirements of our various Protestant sects are definite; they differ slightly from one another, but in almost no respect do they resemble the needs felt by the English Catholics of the fourteenth, or indeed of any other century. That American architecture is obliged to masquerade in dress of forms, outworn in past ages, during civilizations in every other respect now superseded, is deplorable. But unnecessary publication of the fact should be disparaged. It will hardly tend to raise the opinions now held of our profession by the more thoughtful public. Most truly yours, J. T. C.

THE TRINITY COLLEGE CONTRACTS.

Hartford, Conn., *April* 8, 1878.

To the Editors of American Architect and Building News:

Gentlemen, — In reply to the statements of Mr. Brabazon in your issue of March 30th, if you will be kind enough to allow me a small space, I will say that his assertion that I ordered or requested him to prepare bills of quantities of all the stone work of the new buildings for Trinity College, or any portion thereof, is incorrect. I am much better able to do that myself, and therefore should not feel compelled to ask, request, or hire the services of a man who was obliged to procure the assistance of a carpenter to prepare his final bill for the work. I did not use Mr. Brabazon's valuable time — for it was precious as after events proved — at all, beyond inquiring certain rates and prices for particular portions of the work, as is the universal custom. At the same time I procured prices from other stone contractors, for fear of error in judgment on Mr. Brabazon's part. Each of these men, and many others besides, were kind enough to volunteer their services to prepare estimates, of which I availed myself in a few instances around home. Mr. Brabazon among the number. Your correspondent a short time since gave a correct report of the whole case. I do not wish to prolong a discussion of no possible interest to the profession or public. If Mr. Brabazon was employed to do a certain piece of work, he would have been paid at the time, but, curiously enough, his claim was not presented until after the contract was awarded to another party, some three or four months afterward. Professional building surveyors usually present their bills or secure one payment at least before the expiration of that length of time.

To sum up the whole matter, if Mr. Brabazon had been employed, I would have certified to his account as soon as the work was done, and it would have been paid promptly. He was not, and therefore I refused to do it. The decision of the judge was as great a surprise to the local contractors as to myself.

Respectfully, Francis H. Kimball.

COMPETITIONS IN INTERIOR DECORATION.

The committee on the last competition have awarded the prizes as follows: the first prize to the design marked "Midnight Oil," the second to "A Rough Sketch," and honorable mentions to "H" in a circle, and "*Ars longa, vita brevis*." A detailed report will be given in our next number.

Competition No. 8. — The Decoration of a Wall.

The subject of the third competition will be a portion of a dining-room wall between two windows which are twelve feet on centres, the room being fourteen feet in the clear. As the problem is essentially a problem of surface decoration the dado and frieze, if employed, should in treatment be properly subordinated to the wall. The drawings should be received at the office of the *American Architect and Building News* on or before May 11. Required: an elevation and details to a larger scale. For conditions and regulations see *American Architect and Building News* for January 26 and March 2.

NOTES AND CLIPPINGS.

Pennsylvania's Heroes. — Robert Fulton and General Peter Muhlenberg have been chosen as the two men who have reflected the most glory on the State of Pennsylvania, and are therefore the most suitable subjects for the two statues which that State is allowed to place in the Hall of Heroes at Washington. Fulton's merits are well known to all, and are beyond dispute. General Muhlenberg was a clergyman in the Church of England, who, after a stirring sermon on the duties of patriotism, threw aside his gown, appearing in a soldier's uniform, with the words: "There is time for all things, — a time to preach and a time to fight, and now is the time to fight." He served with merit and rose to the rank of major-general. It was generally believed that General Anthony Wayne would be one of the heroes selected to represent the State. The sculptors who are to execute the statues have not yet been determined on.

Building Accident. — The key-stone of the door-way arch of a school-house at Canton, Ohio, fell the other day upon a school-girl who was entering the building. The stone weighed about a hundred weight, and by its fall crushed the girl's foot so that amputation was necessary. The accident caused a panic amongst the other scholars, who imagined that the whole building was about to fall.

The Poughkeepsie Bridge. — The details of the construction of the bridge over the Hudson at Poughkeepsie, are not without much interest. This bridge, which is to connect the coal regions of Pennsylvania with New York City and the Eastern factories more directly than they are connected at present, is to consist of five spans of five hundred and twenty-five feet each, which are one hundred and thirty feet above the level of the river at high tide. The force of the river's current and the depth of the river at this point render the sinking and securing of the caissons which are to form the foundation of the bridge piers, matters of no little difficulty. The caissons are made of heavy squared timber, framed together so as to leave forty compartments extending throughout the height of the caisson. Twenty-eight of these "pockets," as they are called, have tight bottoms and receive the concrete which is needed to sink the structure to its position. When the bottom of the river is reached dredging is resorted to; the "clam-shell" dredges working in the twelve bottomless pockets, which are eleven feet square. When the dredges have finished all that can be done by them, divers descend and finish the work by thoroughly cleansing the river's bed and removing all sediment. Concrete is then filled in to these twelve pockets till it reaches the top of the caisson, which rests twenty-five feet below the surface of the water, and the foundation is ready to receive the stone-work of the piers. The caissons are fifty by one hundred feet in area, and their lower ends are solid for a distance of sixteen feet and are wedge-shaped, so that they may more easily sink to position. The distance that the second caisson had to be sunk was one hundred and twelve feet below high-water level. The cost of the bridge will be between three and one half and four million dollars.

A Bridge Accident. — We have often wondered how much heed was ever paid by teamsters to the placards which are posted at the entrance to bridges forbidding the transport of loads weighing more than a certain amount. Many a bridge doubtless gets a fatal strain by being subjected to an excessive weight, but holds up long enough to receive and fall under an apparently safe load. Hence the censure of the coroner on builder and engineer. One of the most singular uses to which a bridge can ever be put was instanced at Toledo, Ohio, where an iron bridge less than a year old was subjected to a load which the designer and builder could never have imagined it necessary to provide for, — a house. It is hardly necessary to say that although the house had almost finished the passage, the bridge fell, and killed two men.

The United States at Paris. — The façade of the United States section in the main exhibition building is said to be in a very forward condition, thanks to Mr. Petit's energy.

A New Bridge over the Thames. — A bridge of such proportions as the world has never yet seen is proposed by Sir Joseph Bazalgette, for the purpose of connecting the two banks of the Thames in the vicinity of the Tower, and the plan has received the approval of the Metropolitan Board. The operation contemplated by the Board consists in building up a structure of steel crossing the Thames in one tremendous span, clearing the water at such an altitude that three fourths of the masted ships which require to do so will be able to pass under the elevated roadway without any hindrance, while the remaining fourth will merely have to lower their topmasts, which they may very well afford to do, as topsails are not needed in the Thames above Gravesend. The case now before us affords a striking instance of the great practical results which are apt to follow from improved processes in the arts. Steel, when perfect in its composition, is capable of bearing a much more severe strain than iron, but the difficulty has been to insure uniformity of quality in the superior metal. Sir J. Bazalgette observes that until a recent date the costliness of steel and the uncertainty as to its quality have prevented its use in large structural works. But the improvements which have been effected by Dr. Siemens and others in the manufacture of this metal have rendered it more thoroughly trustworthy, and have enabled it to be produced at a moderate cost, with nearly double the strength of iron. Hence it is now possible to construct such a bridge as would have been practically out of the question a few years ago. One bold span of eight hundred and fifty feet will carry the proposed highway across the river from the Irongate stairs to Horselydown. Of course the approaches extend farther inland. The bridge is designed in the form of an immense span, and is composed of two parallel girders, the arch springing from the foot of that which appears to be a tanking tower on each side of the river. The roadway passes almost in a level line very near the top of these towers, and intersects the arch at a short distance from the shore, the greater part of the roadway being suspended from the parallel girders between which it passes. The design is, in fact, a simple one, and if it does not strike the eye at once as possessing any degree of elegance, it cannot be called altogether ugly. — *London Standard.*

Defective Sewerage. — In consequence of the bursting of a sewer, a considerable section of South London is flooded to the depth of two or three feet. Much damage has been done on Brixton, Longlibarough, Kennington, Clapham, and Camberwell New Roads.

The Observatory at Armagh. — The astronomers at the observatory at Armagh, Ireland, were for a long time troubled by unaccountable variations in their fixed instruments. Detecting the fact that the variations were caused in some way by wet weather, they investigated the foundations, and found that a stratum of clay passed under the building and swelled or contracted according as there was more or less moisture in it. It would be interesting to know what means were adopted to counteract this apparently uncontrollable phenomenon.

An Immense Model Tenement. — The London *Daily News* states that Lady Burdett Coutts is negotiating for land in Osnaburgh Street, on which she intends to erect lodgings for the poor, capable of accommodating 10,000 persons, at a maximum charge of four shillings sixpence weekly per domicile. We hope that this philanthropic lady will not follow the example of the banker, Mr. Hankey, and undertake to house this small army of tenants by carrying the building twelve stories into the air. We cannot but think that there must be an error of a cipher or two in the number of tenants mentioned by the *News*.

Unsafe Dams. — The heavy spring rains have caused much uneasiness to people who live in the water-ways below any suspected dams. As yet, none have given way; but the dam at Ashburnham, Mass., which gave way in 1860 with such disastrous results, is now watched with much anxiety, as it is reported leaking. The dam, which is some two hundred feet long, is said to hold back one hundred acres of water.

The Paintings at the Luxembourg. — It has been determined, most foolishly, to remove from the Luxembourg Palace the paintings of modern artists which are usually exhibited there, and hang them, during the exhibition, in the French section of the gallery of the fine arts. If this is really done, it will not only occupy a large part of the already too limited space, but it will lessen materially the attractions of one of the most frequented resorts of the traveller and the amateur. The committee who have charge of the department of sculpture have adopted a wiser course. All statues and pieces of sculpture worthy of mention are to be entered in the catalogue, with full information as to their position and the means of seeing them, but are to remain in the places they now occupy, be it in a public square, a church, a public building, the Louvre or the Luxembourg. It may not be known that the galleries of the Luxembourg are, as it were, a kind of artistic purgatory, in which are placed the works of modern artists which the government sees fit to buy; here they remain during the lifetime and until ten years after the death of their authors. Then they are transferred to the galleries of the Louvre.

Later information has reached us to the effect that the Minister of Public Instruction has authorized sculptors to exhibit at the Exhibition the original statues on condition that they substitute for them in the public squares plaster casts which are to remain until the originals are replaced.

Important to Painters and Sculptors. — It has been decided that painters and sculptors who send their works to the Paris Exhibition may add to the name of the work exhibited the names of any other works of theirs that may have been executed either on or in public monuments.

Art by the Yard. — The other day the cyclorama of "Paris by Night," which was exhibited at Philadelphia during the Centennial, and since, was sold at auction for $250, which was probably less than the 40,000 square feet of canvas were worth. The original cost is said to have been $75,000.

The Brass Font at Liège. — The *Academy* says that the South Kensington Museum has lately received a cast of the brass font in the church of St. Bartholomew at Liége. This font is attributed to the Flemish sculptor Lambert Patras, and thought to have been made in 1112. Around the font are represented in bold *alto rilievo* the baptism of the apostles, with that of Christ in front, around whose figure the water ascends like a garment, while two angels stand by with offered towels. The apostles are immersed for half their lengths in small tubs, and are very droll to look upon. Below these figures is a series of twelve bulls, also in high relief, remarkably well individualized in expression and action.

An Umber Bed. — Mr. B. J. Newell has discovered in Dalton, Mass., a bed of umber of considerable size, which analysis shows to be equal in quality to the best Turkish umber. Almost all the umber used in this country comes from Turkey and the Isle of Wight. It is found only in two other places in the United States, — in Oswego County, N. Y. (in such small quantity that it is not worked), and in the mountains of North Carolina, so far from a railroad that it is not dug.

Spontaneous Combustion. — A writer in the *Mechanics' Magazine*, London, in giving an account of his experiments with spontaneous combustion, states that he took a handful of cotton waste, soaked it in the oil to be experimented upon, wrung out the excess of oil, and then put it into a box with some dry cotton. The box with its contents was then heated to 175° Fah., and in 73 minutes the cotton saturated with boiled linseed oil was found to be on fire. Boiled linseed oil and seal oil were found to be the most combustible; next in order came lard oil, which took four hours; raw linseed oil took four to five hours; rape oil and Gallipoli olive oil took a little longer than the last. All the oils thus named are others of glycerine. Castor oil, which is not an ether of glycerine, took two days to ignite spontaneously; sperm oil, too, does not ignite; and the petroleums actually stop the spontaneous combustion of the oils above mentioned.

The Versailles Gallery. — Several rooms at Versailles, hitherto closed to the public, are to be opened from May 1st. They contain as many as 1,000 historic portraits, dating from the foundation of the monarchy to 1790.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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BOSTON, APRIL 27, 1878.

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MOST cases of litigation between architects and clients are decided in very unsatisfactory ways. Either from the anxiety of counsel to get their clients out of them by any accidental pleas that they can devise rather than by bringing general principles of law to the test, or from what seems the over-caution of judges in confining their opinions to the narrowest possible lines of legal argument, or from the disposition of juries to shirk their work, and instead of fairly facing and recording the facts in the cases before them to decide by rule of thumb and general average, it happens that case after case is brought forward which seems to involve points of importance in the jurisprudence of architecture, and is in some way disposed of without determining anything of value beyond the moment. The records are written in water: every case leaves the determination of the law just where it finds it, and the whole machinery of trial — courts, counsel, and juries — is wasted in the patching up of petty quarrels, while the jurisprudence of a difficult and increasing province of litigation goes begging for want of attention. Since we are not lawyers, it does not become us to try to decide whose fault all this is, nor to say that it is anybody's fault; but we do feel warranted in saying that it is very unsatisfactory. If architects will be public-spirited enough, when misfortune involves them in legal dispute with their clients, to make their stand upon the principles which concern their profession, and if they can prevail on their counsel to conduct their cases with reference to what is of prominent importance, rather than to momentary advantage, it may be possible to get some things recognized by the courts which have long been matters of usage, and to let the profession and the public know a little more securely how they are expected to stand towards each other.

We seldom see a less significant termination to a promising lawsuit than that of the suit of Washburn *vs.* Wildes, just decided in the Supreme Court at Boston, Mass. The plaintiff was an architect who sued for an unpaid balance of nine thousand dollars as his fee for professional services in the building of a block of stores for the defendant, the commission being rated at five per cent on the cost of construction. The defendant claimed that the architect had agreed to provide plans and specifications and superintendence for the usual commission on the estimated cost of the building, and that the architect's estimate was ten dollars per square foot of area, whereas the building had actually cost fifteen dollars per foot; also, that the customary architect's commission never exceeded three per cent. The main questions raised were whether there had been any specific agreement as to the rate of compensation, and what the usual rate was. On this last point there was more or less conflicting testimony from architects called on both sides. The essential points of the judge's charge were: that "if the minds of the parties met" on the question of rates, — a phrase which we do not too well understand, — this made an agreement; or if the architect mentioned five per cent and the client told him to go on with the work, that was an agreement, which the client could not revoke if he afterwards concluded that the usual rate was less; that whatever rate was agreed on should be computed on the actual cost; that if there had been no specific agreement as to rate, it was for the jury to determine from the evidence what was the customary rate. The verdict, as reported, was simply an award of thirty-three hundred dollars for the plaintiff. This leaves out all that most people will care to know. It would be of some interest and value in future cases to learn whether the jury decided that Mr. Washburn was entitled to an extra payment because his fee should have been five per cent instead of three, or simply because it should have been computed on the cost instead of the estimate, and to know their opinion of the prevailing usage; but to hear that they awarded him a sum of money because they concluded that it was about what he ought to have, is of very little interest to any but the plaintiff and defendant. The one point of any value established seems to be that stated by the judge, which is according to usage, that the percentage should be reckoned on the cost and not on the estimate.

THE question of fees is somewhat embarrassed in the case we have considered, and others like it, by the habit which is current among architects in the United States, and is recognized in the schedule published by the American Institute, of considering three per cent a full commission on what are called "stores." These mean business premises containing shops, warehouses, lofts used for storage or light manufacturing, and the like. The commission is lowered on the understanding that they demand less work from the architect in proportion to their cost than most other buildings. This is more or less true of the typical stores, that is, buildings costly because of their materials and solidity, built in blocks, with but one exposed front, simple in interior arrangement, and with little inside detail, so that they do not call for a great deal of study in designing. It is perhaps to be regretted, nevertheless, that such a diminished rate of compensation has been proposed as a rule, for it often happens that commercial buildings require a great deal of work. When they have two or more façades, especially if the façades are of studied and complex design, or when they involve, as they often do, special difficulties of construction, or are elaborately arranged and finished within, three per cent may be a very inadequate payment for their architects, taking account only of the work upon them. But besides this it is to be remembered that, as we have heretofore argued, the architect's fee is not based on any computation, except to a very secondary degree and in the most general way, of the labor of particular services, but on the value of his service to the employer, and on its responsibility. The responsibility of the architect increases with the cost of the building, and so does the importance to his employer of his service, whether his labor does in a particular case or not. The actual amount of his work is so uncertain, so out of the reach of computation beforehand, — if he does it faithfully and zealously, — and even so difficult to measure after it is done, that it is scarcely worth while to try to take it into account in laying down general rates of charges. It would be a much more reasonable system, and could hardly lead to any more disagreement, to maintain the uniformly established rate of five per cent for all kinds of work, and leave it to the individual architect, when there was special reason for it, to make such abatement as he thought the case required.

THE contract which the commissioners for the Indiana State House have made with their chosen architect, Mr. May, ought to go far to console his wounded competitors for their disappointment. He begins by signing away what his profession considers its birthright in agreeing to "prepare, and make over to the State as soon as prepared, all plans, specifications, directions, and estimates that may be made by him." He guarantees that every part of the building shall be perfect and complete in itself and sufficient for its purpose, as shown in his plans; that it shall be completed in every part within the cost fixed by his estimates; and that no extra work or material shall be necessary, or that if any is required, unless called for by changes made in the plan by the commissioners or the legislature, he will pay for it himself. He is to be a supervising architect, but the State is to provide a superintendent while the work is actually going on, whose duties shall be prescribed by the commissioners. If

the architect objects to any materials or work provided in the building, he is to file a written protest against them with the board; otherwise he will be considered to have approved them. His commission is fixed at two per cent on the cost, to an amount of not more than forty thousand dollars. Finally, he agrees "in all cases to submit to and be bound and concluded by the decisions of the board as to what constitutes his duties as architect." For all this he gives bonds in the sum of one hundred thousand dollars. It will be interesting to note the way in which this work goes on. The commissioners seem to be doing their work pretty thoroughly; they have at least reserved the power of making their architect's life a burden to him. It is possible that a more exacting board might have required that he should submit to have his ears cropped and his nose slit in case of any attempt to escape from servitude: excepting this we do not see that there is anything in reason left for them to demand.

The enterprising people of Providence have had a long and tiresome struggle over their new building law, which has at last passed the state legislature, though it is shorn of a good deal of what promised to make it effective. The bill, as at first prepared, chiefly by the Rhode Island Chapter of the Institute, was studied with a good deal of care, and was in some respects more efficient than any that had been proposed elsewhere in the country. It met with a vigorous and prolonged opposition among the building trades of Providence, — an opposition of which, as well as of the character of the bill, we have from time to time made mention, — till it began to look as if the bill would either be absolutely killed, or so dismembered as not to be worth passing. It has been carried through in a shape that leaves it still a law, if not a very efficient one; but the *disjecta membra* left on the field show the severity of the struggle. For instance, the section which gave the city council power to forbid wooden buildings in any part of the city was struck out, and wooden buildings not over thirty feet high, with shingled roofs, are allowed to be built anywhere. In fact, so contemptuous are the Rhode Islanders of danger from fire that they rejected, as if out of pure bravado, even the provision that wood-work should be kept away one inch from all chimney flues. After this it is not surprising that the modest provisions for testing beams or computing floors and certifying their strength should be done away with, or that the whole efficacy of the bill should be undermined by refusing to require either permits for building or the submission of plans to the building inspector, thus saying in effect to the people of Providence that they may after all build as they please, provided they do not attract attention. There is, however, something gained when a stiff-necked people is persuaded that there is any occasion for regulating building at all by law.

The seat of the labor war in England is fairly transferred to Lancashire. The notice of the ten per cent reduction of wages in the cotton mills expired a few days ago, and the promised strike was begun. It is said that twenty-five thousand hands are thrown out in Blackburn alone. The strike district contains nearly half the looms in the kingdom, or nearly a quarter of a million, representing six million spindles. At Preston, we are told, where there are half a million spindles, the operatives have accepted the reduction; but in Blackburn and elsewhere, they are resolved to hold out. There probably never was a more hopeless occasion for a strike, for the English cotton trade is now sadly depressed, even more so than the American, and to such a degree that to many of the masters it may well look like a question between reduction and bankruptcy. It is likely that in many cases the stoppage will give a not wholly unwelcome breathing-time. In fact, it seems as if the operatives were more or less aware that they were playing a losing game. A letter to the *Times* from the secretaries of the Weavers' Unions has rather the sound of a dispirited resistance than the defiant ring to which we are used. It says: "We feel we are struggling in a just cause, but are ready to bow to the decision of a court of arbitration; and although we fear we are unable to cope with the organized power of masters' unions, we shall peacefully and quietly resist until starvation forces submission." In the present case it does not appear that the masters are inclined to arbitration, and it will probably be a question of endurance by the workmen which, with a burden of a hundred and thirty thousand idle operatives on the shoulders of the unions, cannot probably be long maintained.

On the other hand, we find unexpectedly cropping out in our own country a recognition of the fact that at least for the purposes of temporary warfare, the interest of masters and men may after all be the same. The General Marion Council of the Order of United American Mechanics has taken alarm at the introduction of Mr. Wood's Tariff Bill into Congress, and has passed a set of resolutions, declaring that a just and equitable high tariff is "the best safeguard of American industry, and of the welfare of the whole American people," calling upon Congress to "refrain from meddling with our present system," and finally protesting: "We will strenuously oppose any attempts to make the labor of this country appear hostile to capital; they are bound to stand or fall together, and we know it. Those who invest their capital in giving employment to the people of this country are our friends, and we feel in duty bound to protect their interests as well as our own from the meddling of men whose past records everywhere are a silent admonition to us to be watchful in the future." It is an ill wind that blows nobody good.

The report of the chief engineer of the city of Brooklyn to the common council brings to light a fact that the writer of the articles on "Urban Housing," which we have lately published, could have adduced as proof of the correctness of his inferences. Being one community with New York, it is not strange that Brooklyn adopted the same system of laying out its building-lots, and that the city was divided into building-lots of twenty-five feet frontage. But in time Brooklyn people found that a twenty-foot lot answered their purposes quite as well, and when another part of the city was laid out, the street lots were numbered so as to give five to every one hundred feet. Since the panic of 1873 the citizens have discovered that they can live in houses even narrower than this, which has necessitated giving to the houses built on the surplus land half numbers. This practice has become so serious a nuisance to the post-office and to the business public generally, that the chief engineer now proposes to renumber the city, assigning six numbers to every hundred feet, a course which will reduce the frontage of lots to sixteen feet and eight inches. If this is carried into effect, these narrow-gauge houses may become as typical of Brooklyn as the "back-buildings" are of Philadelphia, or the "one-eyed" houses are of Baltimore. It is possible that the predilection for living in hotels and apartment houses, which almost amounts to a national peculiarity, may be insurmountable, and that if cheap houses of small size are made really comfortable, it will do little to counteract the tendency; yet if it is worth while to get the working man out of his crowded tenement for the sake of his health, there will be many who will think it worth while, for the sake of better living or his morals, to get the man of moderate means out of the hotels.

THE QUALIFYING OF ARCHITECTS.

II.

In our article of last week we discussed the need of some means of duly qualifying architects in the interest of the public, and the authority by which such qualifying could be established, giving our reasons for concluding that the authority of the state was the only one by which it could be adequately enforced. We come now to the difficult questions: What kind of restrictions can be established, and what kind and degree of acquirement can be insisted upon?

In such a case as this it clearly will not profit to try to do too much. It would be labor thrown away to try to prevent an architect's work being done by anybody but a duly qualified architect; for it would not only enlist the active opposition of the large and influential class which wants to do such work without being hampered by qualifications, and the large class which wants to be at liberty to employ this first class, but would at once put the whole effort under the disguise of a protectionist movement, an endeavor to legalize a trades-union exclusiveness. It is clearly enough for the benefit of the public that none but architects should do architects' work; yet a restriction established for the general welfare must not have the air of a privilege conferred upon a class. If a draughtsman or a builder chooses to undertake an architect's work, it would undoubtedly be impossible, in the present condition of public opinion at least, if it would not be undesirable, to prohibit his doing it. The thing to be ordained is that he should not, by the mere fact of electing to do such work, become an architect, but should con-

time to be and to be known as a draughtsman or a builder; and that the person who chose to employ him should employ him as such, knowing and assuming the risk of his competency. In other words, what is to be desired is an authoritative definition of the word "architect;" that the title should be recognized as indicating, not a mere avocation, to be taken and dropped at will, like a commission merchant's or a stock-broker's, but a peculiar professional training, like a lawyer's or a physician's. There ought to be a distinct line of demarcation between the profession and the rest of the world, which a man must visibly cross to enter it; and in crossing it he should be obliged to show some definite degree of preparation for the work of the profession. Then the public may safely be left to get their plans and designs from whomsoever they will,—as they now insist on doing and always will,—but with the knowledge that there is a body of men especially set apart for that kind of service who have undertaken to fit themselves for it by certain recognized methods of preparation. This, we are convinced, is as much as can be looked for in the way of restriction. So much the public ought to see the need of, and to do, for its own protection, but we cannot expect that a discrimination which must rest on the public authority shall be extended beyond this. It would belong to the profession itself to vindicate its superior capability for its own work, and to show that, thus set apart, it deserved confidence.

There are many parts of the country where it would probably be impracticable or idle to fix such legal restrictions as we are hinting at. Where the profession of architecture is not fairly established, it is hardly worth while to provide means of regulating it by law. But in the older and more settled States, especially in those which contain our large cities, it ought to be possible to make people see the advantage of it, and we have no doubt that it may be done, if anybody is earnest enough to take up the work. The obvious, and we think the reasonable way of accomplishing it, is by the passage of a state law requiring that anybody who publicly announces himself as an architect and assumes to practise as such shall be licensed thereto by the state, and that to entitle an architect to a license he must show certain prescribed qualifications. The requirement of a license is not a burdensome one or a new one. It has been laid upon the profession before, during the period of heavy taxes in war time, though there are probably many architects now practising who are not aware of this. It was not found difficult of application, nor was it proved to work hardship, except that of paying a special tax, which is no part of a scheme for professional qualification.

To determine the qualifications which should be prescribed and the tests required for them would be a matter of some difficulty, but need not be considered impracticable. It would of course be necessary that every architect found to be already in practice when such a law went into force should be considered to be qualified *ipso facto*. The application to new cases, then, would be the only one to be considered. The penalty inflicted upon those who should assume to be architects and to practise as such without a license might be nothing more than the loss of protection from the courts, and disability to collect their fees, as is now the case with the law concerning physicians in many States, we believe: or, if it were thought desirable, a more serious penalty might be declared; it being inflicted of course not for undertaking the work of an architect, but for deceiving or attempting to deceive the public by assuming to be one without having complied with the law.

As for the things which an architect should be expected to know, and may be required to have studied, — the things which chiefly concern the public in building are that its lives or its health should not be endangered nor its substance wasted in putting up insecure work or unwholesomely arranged buildings. Therefore an architect should know how to put his material together, and should be able to judge accurately what strains his construction will bear and how it will endure, — should be versed in the theory of construction and the properties of materials, and in the sanitary precautions of good planning. So much is matter of theoretical training. He ought also to have experience enough to know whether his materials are of good quality, and whether the work on them has been thoroughly done and in the best way. This is matter of practical training. Both are things which it is easy to prescribe, and for which it is perhaps not difficult to provide tests, — formal, at least. It is important, also, that an architect should have knowledge and skill for the planning of buildings and fitting them for their uses, — things of which the public knows the importance, and of which it might know that they do not come by nature. Architects know, too, that the crowning excellence in their profession, and its most difficult attainment, is skill in design, and that this requires longer and harder study than all the others. One might suppose that the public would have an eye to this also, inasmuch as it spends a good many millions every year in mere effort for architectural beauty, and nothing else: but in the first place it considers its own judgment enough, without any other test of qualification, in this as well as in planning; and then it is after all a little ashamed of its liking for what it considers beauty, holding to the accepted doctrine of the day, that the smallest matter of convenience is superior to the highest consideration of art, and although it spends money for beauty pretty freely, it is questionable how ready it would be to give the artistic part of an architect's education the importance of a legal sanction. So that probably success would lie in putting the chief stress upon a proper training in construction, which is the thing most important to public security, if not to good architecture; and in being content with such modest provision for professional and artistic skill as could without outrage be required in humble companionship to the other. It may be that in those States where instruction in drawing is a recognized part of public education, some advantage may be taken of this fact in securing more regard for an artistic qualification than would otherwise be attainable. We doubt, however, whether it would be practicable, in a system which depended on the public authority, to make any great point of artistic training. This, the highest and really distinguishing attribute of the profession, would have to be left, as it now is left, to natural selection.

As for the manner of qualification required of new practitioners, it would be well to provide alternatives. One might naturally be a certain number of years' study in the office of an accredited architect, — not less than five, we should say. This, however, would scarcely be an adequate preparation, taken alone, for it is not in the nature of a student's ordinary work in offices to give him any such study, for instance, of the theory of construction as it is really necessary that he should have for the problems that an architect is likely to meet. Another would be a regular course of architectural study, certified by a diploma from some accredited architectural school, in which a careful course of theoretical and practical construction should be imperative, and a year's study or two in a practising architect's office. A third might be a certified examination before an official board. In Massachusetts, for example, such a board might consist of the professors of architecture and engineering at the Massachusetts Institute of Technology and at Harvard University, to whom could be added three examiners at large, appointed by the executive, — say an architect, an engineer, and a builder.

In either method of qualification, then, the first point to be insisted on is a knowledge of construction and of building materials. Even in the case of those who had served their full time in architects' offices, it should be imperative that they should go through a suitable course of theoretical construction, — if not in their offices, which is improbable, in some proper school. To this ought to be added a knowledge of geometry, solid and descriptive, of the sanitary arrangement of houses, and, in those who had not served their time in offices, perhaps in those who had, a satisfactory course in some higher-class drawing-school. In the application of tests, particularly at the beginning, it would not be worth while to be too severe. We cannot expect that everybody should really learn to do his work well. This does not happen in any profession. But the public have a right to require that a man shall not propose himself to them as a capable practitioner in a profession which involves the risk of their property, their health, and their lives, without having at least had an opportunity to learn his business, and having exposed himself to what may be considered a fair preparation.

But while, as we have been insisting, it seems necessary that the authority which regulates the qualifying of architects should be the authority of the public, just as the chief interest in their proper qualification is the public interest, it by no means follows that the thing can be done without the cooperation and active concert of the profession; still less that the architects have nothing to gain by it. The time when the individual could afford to be indifferent to the repute of his profession has gone by. It may be hoped that the time when he is willing to be so is passing away. What the welfare of both public and profession requires now is the proper definition of an architect, and some influence to make those who are to be called architects

conform to it. The problem is a new one to Americans. It has been solved more or less satisfactorily in some Continental countries, we are told. It has been talked about a good deal in England and the United States, without coming to any conclusion; but it is quite time, it seems to us, that something should be done for it. We have given such suggestions as we had to offer, and shall be thankful to any one who will offer us his own in his turn. We commend the subject earnestly to all architects who have an interest in the real success of their profession, and to all of the public who are aware of their own interest in being well served by it.

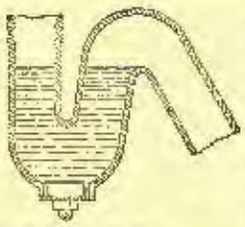
MODERN PLUMBING. III.

WATER-SEAL TRAPS.

INNUMERABLE forms of traps have been invented, of which the greater part, from one defect or another, fall out of use, leaving a small number of standard varieties which have stood the test of experience.

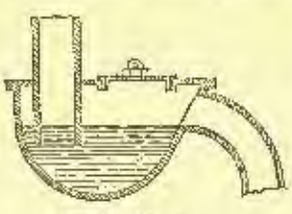
The worst of the common forms is the bell-trap, Fig. 8, so long used for kitchen sinks, but which is fast becoming obsolete as the requirements of a good trap are better understood, on account of the insignificant quantity of water it contains, and the want of head to the flushing water.

The best known of all traps is the siphon, or S-trap, consisting simply of a length of pipe bent in a reversed curve, with or without a brass screw in the bottom for emptying it, as shown in Fig. 1.

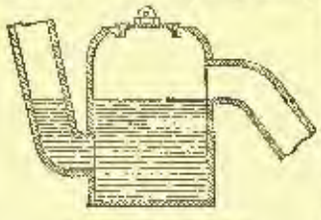


— S TRAP —
Fig. 1.

This form is used for sinks, wash-bowls, water-closets, and drains of every kind, and has the great merit of being easily kept clean, the smooth interior of the tube offering no obstructions to catch paper, hair, or sediment; its defect is its liability to be emptied by the so-called siphon action, or by evaporation of the small quantity of water it contains. The siphon action takes place when a quantity of water passes down a soil-pipe, partly exhausting the air behind it. Air to supply the vacuum is drawn from all communicating pipes, and where these are trapped by a simple bend, the water is easily sucked out. The S-traps under water-closets often suck themselves out, the body of water thrown down when the closet is used creating a vacuum behind it as it descends the soil-pipe, thus drawing out the water which subsequently runs into the trap. This can be remedied by carrying an air-pipe of sufficient size from the top of the trap to some point communicating freely with the air; then any vacuum below the trapping water is supplied through this pipe, and not through the water; but there are traps which cannot be siphoned, even if not ventilated. Among these the most used are the D-trap, the round, or box-trap, in its various forms, and a number of patented varieties, such as Adee's, Bower's, and other traps, all consisting in substance of a small reservoir, into which both the inlet and outlet pipes are carried, the mouth of the inlet being an inch or so below the surface of the trapping water, which of course stands level with the bottom of the outlet. Fig. 2 shows the D-trap in section; Fig. 3, the box-trap as generally



— D TRAP —
Fig. 2.



— ROUND TRAP —
Fig. 3.

put in, though there are various modifications; and Fig. 4, Adee's patent trap.

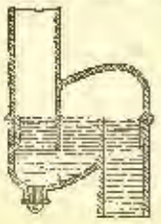
Air drawn through these and similar traps to supply a vacuum below simply bubbles through without driving the water before it, and the quantity of water is so large that they are not easily emptied by evaporation.

The size of the reservoir in the box and D-traps admits a large screw, much facilitating the cleaning out, which is also an advantage, but the large quantity of liquid which all these traps contain is less frequently changed than the smaller quantity in the siphon traps, and often gets very foul, while the edges of the inserted pipes and the interior angles of the trap catch the foreign matters in the water, and they thus gradually become obstructed. Hence, they should be used with discretion if at all.

The box-trap is sometimes put in with the outlet pipe inserted through the bottom. This is very objectionable, from the multiplicity of edges and reëntrant angles which it presents.

A trap like Fig. 5 would be a good form, if a reservoir trap is to be used.

None of these traps are secured against backward pressure of gas, such as arises from pouring hot water down an unventilated soil-pipe, or from obstruction of the sewers in cities by high tides, heavy rains, or other causes. This cannot be guarded against by the feeble resistance of a column of water an inch high, which is all that ordinary



— ADEE'S PATENT TRAP —
Fig. 4.

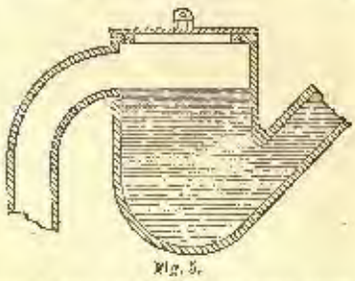
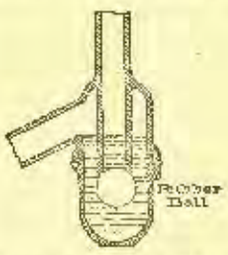


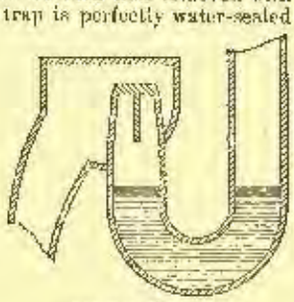
Fig. 5.

traps afford, and where the danger is not avoided by free ventilation of the soil-pipes, the Bower patent trap is very useful.

This (Fig. 6) is a reservoir trap, with the addition of a rubber ball, which floats up against the mouth of the inlet pipe. Any water coming down the pipe displaces the ball for the moment, but pressure from the outside, either of gas or of water, forces the ball firmly against its seat, effectually closing the pipe. This trap is made sometimes with the lower section of glass, screwed to the upper section, so that any obstruction can be seen and removed with facility. One advantage is that the trap is perfectly water-sealed



— BOWER'S PATENT TRAP —
Fig. 6.



WARING'S VALVE
Fig. 7.

whether the ball-valve works or not. A criticism might be made that the course of the water is rather sharply broken, and hair or lint may catch on the lower edge of the inlet pipe, but this is so easily seen and removed that the working of the trap is excellent for washbowls, baths, or other places where a great amount of sediment is not to be feared. Some different forms of valve to resist back pressure have been devised; as, for instance, Colonel Waring's valve, Fig. 7, which caps the top of the water-sealed trap, but the Bower trap is thus far the only one in use to any considerable extent.

In choosing among the different traps regard should be had to the purposes for which they are to be used, as well as to the circumstances of sewerage, ventilation of pipes, etc.

For a wash-bowl the two or two and one half inch S-trap is commonly used, although a small caliber would have advantages, but should in any case always be provided with an air-pipe, otherwise, even though the soil-pipe may be ventilated, the water will sometimes be sucked out and a free passage afforded for foul air into the room.

Where the air-pipe cannot conveniently be used, the trap should be of the reservoir species or one of the patented forms; and if the soil-pipe is unventilated, or ventilated only by an inch pipe, which is little better than nothing, and the drains liable to be locked by the tide, or overflowed, the Bower trap or some equivalent form of valve, although rather more expensive in the first instance, should always be employed, at least where the wash-bowl is in communication with a sleeping-room.

The trap of a wash-bowl should be set a few inches above the floor, so that the screw, which it should always have, may be conveniently reached, for draining the trap in cold weather, and for recovering jewels from rings, and such small articles, which sometimes get in; it should not be directly under the bowl, as is often seen, for the extra head of water obtained by setting it two feet or so lower is of value in keeping the trap clean; and it should never be put under the floor, where it is practically inaccessible.

Where a bowl stands within two or three feet of a water-closet, its waste pipe is often led directly into the water-closet trap, under the surface of the water. This saves some expense, and is not objectionable, except that it renders it impossible to recover lost articles without cutting the work to pieces, since water-closet traps have no screw; but the basin waste should not be carried more than three or four feet for this purpose, as the pipe often gets foul with decomposing soap and slime, and the smell from a considerable untrapped length of it will make itself perceptible in the room.

Bath traps are little liable to be choked with sediment, and may be similar in size and form to those for wash-bowls, under the same

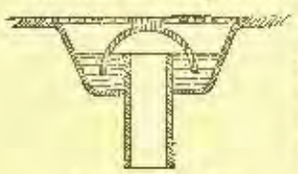
precautions for ventilation and protection against back pressure. The bath waste is very frequently, perhaps usually, carried directly into the water of the water-closet trap, and where back pressure is not to be feared, this is a sufficiently good arrangement. The water in the trap seals both waste-pipes, and having two sources of supply is less likely to get dry from evaporation, and the danger of losing anything down the bath waste is slight. The waste must be connected below the surface of the water in the trap; otherwise, instead of being protected, it will be a mere conduit for leading the foul gases of the water-closet directly into the room. This would seem too obvious for mention, were it not that pipes are often found connected above the trapping water.

Pantry sinks usually have traps of the same size and character as the wash-bowls in the same house.

Bath-tubs, wash-bowls and pantry sinks are always provided with an overflow, in addition to the waste from the bottom. This is usually connected with the waste-pipe above its trap, but is sometimes carried into a different pipe or trap. However it may be arranged, it is of great importance that it should be perfectly water-sealed, as it, in most cases, always remains open, even when the waste is closed by its plug or valve.

For kitchen sinks a very large trap is necessary, for convenience in cleaning out the grease which collects upon the sides in masses so hard as to require a chisel to remove them. An eight inch round trap is a good form, and the screw, which is on the top, is so large that when it is taken off all parts of the trap can be easily reached and thoroughly cleaned.

The little bell trap, consisting of an inverted cup, whose edges dip into a circular trough of water, as shown in Fig. 8 in section, is still found attached to some sinks, often by a hinge, so that it can be turned back and unlimited opportunity given for sewer gas to come up, the waste-pipe and potato parings to go down. Where it is screwed in, the case is slightly better, but it requires such constant cleansing, and the water seal is so slight and so easily removed entirely by evaporation, that the best plumbers always use sinks with a strainer only over the waste-pipe, and depend for the seal upon a large trap below.



— Bell Trap —
Fig. 8.

For slop-sinks and wash-trays a two and one half inch S-trap, with air-pipe, is perhaps the best form. Water-closets usually have a four inch cast lead S-trap, without screw, and this should have an air pipe, especially with closets using a large quantity of water, or where two or three are situated over each other.

To recapitulate the general principles: S-traps are best, if they are guarded —

(1.) Against suction, by proper air-pipes.

(2.) Against back pressure, by the thorough ventilation of the drain and soil-pipe, and

(3.) Against concretions of filth or grease, by being used only to carry clear liquids.

Where suction or fouling are to be feared, a reservoir trap is necessary; and where unventilated drains give rise to back pressure of gas, the Bower patent, or some similar form, if there be any, is the only trap yet in common use which can be depended upon to resist it.

Over-anxious architects sometimes specify for two traps in the same length of waste-pipe; where this happens, accidentally or otherwise, an air-pipe must be put in between the two traps, and carried to some free outlet, or the air confined in the waste-pipe between the two traps will impede the flow.

Ventilating pipes from traps should be large enough not to get choked with the grease which often spatters into them, and should never be carried into a chimney. They are, of course, always connected on the drain side of the trap, and the gases of the drain constantly fill them and the flue with which they connect, so that the slightest down-draught pours them out into every room which has an opening into the same flue. It is not too much to say that in the majority of chimney flues the draught is, for more than half the year, usually downward, and even where a moderate ascending current can always be kept up, it is seldom rapid enough to withdraw the foul vapor in time to prevent its contaminating the rooms connected with the flue by simple diffusion through the surrounding air.

The best way is to have a special flue in the chimney, next to the kitchen flue, but not communicating either with that or any other, and carry all the vent-pipes into it. The warmth of the neighboring range flue may cause a gentle movement of the air in this flue, but that will be of little consequence, as even a down draught can only blow the gas back into the drain, and not into the rooms, while the main object of the vent-pipes, — that of relieving pressure of gas in the drains, and of preventing siphonage, — is secured.

It cannot be too often repeated, that the most dangerous sewer vapors are nearly or quite inodorous, so that the sense of smell may be worthless for detecting whether a drain ventilated into a chimney sends its gases up the flue or into the nearest room, through a fire-place or stove-hole. The probability is, that some gas finds its way through every opening into the flue, and the only means of safety is to keep such a flue entirely closed.

THE ILLUSTRATIONS.

HIGH SCHOOL, LIBRARY, AND READING-ROOM, DEERFIELD, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON.

This building is now being put up at Deerfield, in accordance with the will of the late Mrs. Esther Dickinson, of that place. It is arranged so that the public entrance gives access to the library, reading-room, and large hall without disturbing the scholars, for whom there are separate entrances. The building is centrally placed, in this extremely picturesque old town, and near the site of the historical old house that was besieged by the Indians, the remains of which are now preserved in the town.

THE SPRINGER MUSIC HALL AND EXPOSITION BUILDINGS, CINCINNATI, OHIO. MESSRS. HANNAFORD & PROCTER, ARCHITECTS, CINCINNATI.

The drawing shows the Springer Music Hall and proposed Exposition Buildings. The entire group will cover an area of 116,000 square feet. The Music Hall is the central feature of the group, and is now nearly finished, it being the purpose to dedicate it by a Musical Festival, which will begin Tuesday, May 14, 1878, and continue during four nights and three days. The Exposition Buildings are not yet built, but will be in the near future.

The Elm Street façade of the Hall is 182′ wide and 150′ high, to the apex of the central gable. From a flagged pavement 40′ wide a flight of steps leads to a stone terrace 12′ wide, on which open nine outer vestibules 16′ x 7′ 3″, of which the entrances are 11′ wide, affording clear entrance way of 99′. The grand vestibule is 46′ x 112′, and is 42′ high, with a broad balcony at the level of the gallery in the hall, and the north and south vestibules measure 31′ x 46′ and are 20′ high. From these vestibules solid stone stairways 12′ 8″ wide lead to the galleries and upper rooms. The auditorium or Music Hall proper is 112′ wide, 192′ long and 64′ high. The stage is 112′ x 56′; the organ, however, intrudes upon this space by occupying an area about 15′ x 50′. Accommodation is afforded for a chorus of 686 singers and an orchestra of 100 performers. The floor of the auditorium rises from the stage to the entrance 4′ 8″, the stage level being at its front 1′ 4″ above the floor, with a rise of 14 inches from front to rear. Three entrance doors, each 10′ wide, lead from the grand vestibule to the Hall, while corridors 18′ wide, with eight doors each 7′ wide, give access to the hall on the sides, thus giving a total of 86′ in door-ways. Separate doors lead to the stage. The corridors extend through the building and communicate with Plum Street. A flight of stone steps 9′ wide, in each corridor, leads to the upper stories. In emptying the house cross-currents will be avoided. Back of the stage are retiring-rooms for the performers, while water-closets and wash-rooms are amply provided under the several flights of stairs.

An examination of the dimensions of the auditorium, before given, will show that a unit of 16′ has been used. A gallery 16′ wide extends around three sides of the hall at the second floor level, while an upper gallery of like width extends across the end opposite the stage. The Hall gives promise of being an acoustic success, having been used on two occasions for mass rehearsals of the Festival Chorus; the full proof, however, of this vitally important matter is still to come on the occasion of the opening. In the second and third stories over the several vestibules are rooms for the use of conventions and other large gatherings. Over the grand vestibule in the third story is a small hall, 46′ x 112′. It will probably be called Dexter Hall, after Mr. Julius Dexter, a liberal subscriber to the building fund, secretary of the board of trustees, and chairman of the building committee. Dexter Hall is approached by two easy flights of stone stairs, each 7′ wide. The Elm Street façade is built of pressed brick, ornamented with black brick in the arches, etc., and relieved with bands and moulded string courses of Ohio River sandstone. The bricks are laid in black mortar, with a sunken joint, ⅛″ deep. The effect is to give a decided structural appearance to the surface, which in so large a building is an advantage. The Plum Street façade is built of best quality common red brick laid in yellow mortar with flush joints. The effect is to enhance greatly the body color of the building; so that in the glow of an afternoon sun it warms to the intensity of coral.

The entire length of the building is 303′ 4″. The total number of rooms is 87, exclusive of the Main Hall and Dexter Hall. The walls and ceiling of the Main Hall are lined with wood, — no plastering being used. Under the system of seating adopted for the coming Musical Festival the Hall will accommodate an audience of 4,128.

It is not out of place to state that the entire project is the result of the munificent offer of Mr. Reuben R. Springer, made in May, 1875, immediately following the second Biennial Musical Festival, in which he proposed to contribute $125,000 for the purpose of building a Music Hall, upon the conditions that (1) a corresponding amount of money be contributed by the citizens, and (2) that the lot at the corner of Elm and Fourteenth streets be given by the city, for the perpetual use of a society to be formed for the purpose. Mr. Springer has since his first gift increased the amount, until it has reached the sum of $185,000; the remaining sum of a little over $300,000 (the cost of the building) has been subscribed by the citizens. We published in our issue for September 16, 1876, the other designs for this building submitted in limited competition.

PALERMO.[1]

To the casual visitor to Palermo, or to those who stop only a few days to see the "lions" of this interesting and in some respects beautiful town, the view here shown will probably be unknown. The cicerones of the place will not lead the strangers there, nor can it with much justice be asserted that the view can have any claims to be counted amongst the principal sights of the town. But those who are in the habit of dispensing with the services of cicerones, may stroll about and get lost in the out-of-the-way-places in such a curious town as Palermo, and come upon sights, in their perhaps perverted ideas, fully as interesting or characteristic as any of the "lions;" and it was in one such pilgrimage that this view was encountered and noted down. Here you have a glimpse of the old Duomo, and, most prominent in the view, the great belfry crowning a part of the Archbishop's palace. A suggestion is given of the western façade with its flanking towers, and a very small portion of the north side, altogether too slight to show the curiously mixed, but not unpleasing, *tout ensemble* of a building which exhibits externally a strange combination of Saracenic, Norman, Gothic, and modern work. Two towers, similar to those of the west end, flank the east end of the Duomo, which terminates in a semicircular apse. Over the crux rises a dome, and smaller domes cover the chapels of the aisles; these are all modern classic, that over the crux having been constructed at the beginning of this century by Ferdinando Fuga, a Neapolitan architect, who for his work deserves but scant credit, as this dome surely is not a thing of beauty! It is very uncertain how early in Christian times the site was occupied by a church; but no doubt the Byzantines, who under Belisarius conquered the town from the Goths in 535, had erected a cathedral here, which was afterwards either destroyed or converted into a mosque by the Saracens, who in 831 became masters of Palermo. Of this mosque little or nothing remains, except, perhaps, some columns and capitals, such as, for instance, the one with a Cufic inscription, to be seen in the south porch. In the year 1169, after the town had been in the possession of the Normans some ninety-seven years, and the old cathedral or mosque was demolished, the present building was begun by Walter Offamilio, an Englishman, and archbishop of Palermo. The cathedral was consecrated in 1185. Having since undergone many alterations and additions, the only apparent remains from this earlier time are some portions of the south transept, the crypt, and part of the apse, and some of the pointed clerestory windows, with a few minor details here and there. The Saracenic tradition has been retained throughout the Norman work, whether of the earlier period or in later additions, especially as regards the windows, the arches of which have all the broad and shallow mouldings, or rather the successively slightly sunk concentric orders, peculiar to such undoubtedly Moorish buildings as may still be seen in the neighborhood of Palermo. It was a simple and rather refined treatment, and had its hold upon the builders long after the Norman sway was at an end.

The west front, with its two towers, dates from the first half of the fourteenth century, but its great central doorway is a few years later. There are three western doorways, but I could only discern the centre one from my point of view, in consequence of the deep shadow; this centre doorway is large and richly moulded, and the marble which it is composed of has toned down from the original white into a beautiful rich brown. There are two hood moulds or labels, the inner one rectilinear and terminating in a niche, containing a figure of the Madonna; the very lofty outer one contains within its arch at the top a richly decorated pointed window. Above, runs an arcade the whole width between the towers, and uppermost a cresting or battlement of Saracenic form, which continue at their respective levels round nave, aisles, transepts, and choir. The richest feature of the exterior of the Duomo is the south porch, which consists of three wide, pointed arches, stilted as in earlier Norman-Saracenic work and enriched with bold cable mouldings. The middle arch is the broadest and highest, and the three arches spring from two single marble shafts in the centre, with foliated capitals and two columns at the responds, with capitals of Moorish character, one with a Cufic inscription from the Koran. The foliage of the two centre capitals reminds one strongly of that late Gothic foliage which may be seen in good preservation in the ruins of some of the Scotch abbeys, but especially at Melrose; and altogether, although entirely Sicilian in outline, there is in the details of this porch much of northern Gothic character. The spandrils or the spaces between the arches and the broad architrave are adorned with a rich, flowing pattern in low relief, partaking both of arabesque and flamboyant, and the architrave itself contains small Gothic niches with saints. The cornice is richly carved with interlaced work of foliage and animals, and the very flat pediment is enriched with tracery and sculpture of late Gothic type. The corners of the porch are in form of towers, terminating just above the cornice, and crowned at the angles with statues; these towers resemble in their details northern Gothic work. This elaborate porch dates from the middle of the fifteenth century, and is the work of Simon of Bologna, archbishop. The Duomo has undergone modern restoration, and thus in detail lost much of its interest, and especially as to the apse, which is of that Norman-Saracenic character of shallow interlacing arches, with inlaid geometrical ornaments and grotesque animals, arranged regularly and not so varied as similar ornament in northern work. This apse is similar to the unrestored, and therefore historically more interesting, apse of the cathedral of Monreale, which latter is of rather better proportion.

To speak of the interior of the Duomo with even approximate fulness would take up more space than this notice claims, or a very great deal might be said to show how far back in Norman times its history extends. Now the whole is completely modernized and classic in character, not bad perhaps, but surely inferior to the original work which forms the skeleton. Here are marble and porphyry tombs of Norman, Suabian, and Arragonese rulers, and in the old Norman crypt, *four-and-twenty* tombs of archbishops of Palermo, among them that of Walter Offamilio, who died in 1190. There are some noteworthy pictures by Sicilian masters, among them Pietro Novelli, called Monrealese, a good painter of monks especially, but little known out of Sicily. There is also some clever sculpture by Antonio Gazini, one of a family of Palermitan sculptors which flourished at the end of the sixteenth century and during the century following. In the choir are good Gothic stalls and a bishop's throne of oak, somewhat rudely carved on closer inspection, but at a distance a rather picturesque object.

Two lofty arches, seen in the sketch, span the street separating the Duomo from the archbishop's palace, and correspond nearly with the width of the belfry-tower, which forms part of the palace. A massive building, stretching north and south, forms the base of the tower, which rises from the northern end: the corners of the building terminate in angle-turrets. The pinnacles of the tower above are, similarly to those of the four towers of the Duomo, very curious, and unlike Gothic work. A tower has stood here from very early times, for it is recorded that when in 1169 the Palermitan insurgents pursued the Chancellor Stephen he took refuge in this tower, or its immediate predecessor. It will be remembered that it was in this year that Gualterio Offamilio began the rebuilding of the Duomo. The present form of the tower was given to it by Archbishop Simon, the builder of the south porch, before mentioned, at about the middle of the fifteenth century, but much of its earlier character must have been retained. At the same time the rest of the palace was rebuilt, but of this structure little now remains, except some portions of the walls, and a large traceried Gothic window of some elegance at the southeastern corner of the palace. The churchyard, or Piazza del Duomo, to the south of the cathedral, and separating it from the Corso Vittorio Emanuele, is surrounded by a stone balustrade, at intervals strikingly adorned with statues of saints and bishops, two of which on the western side are indicated in the sketch. The enclosure was prettily laid out and planted in the summer of 1875.

A. H. Haig.

[1] The illustration and the descriptive article were published in the *Architect* for January 5, 1878.

NOTICE OF THE SECOND COMPETITION IN INTERIOR DECORATION.

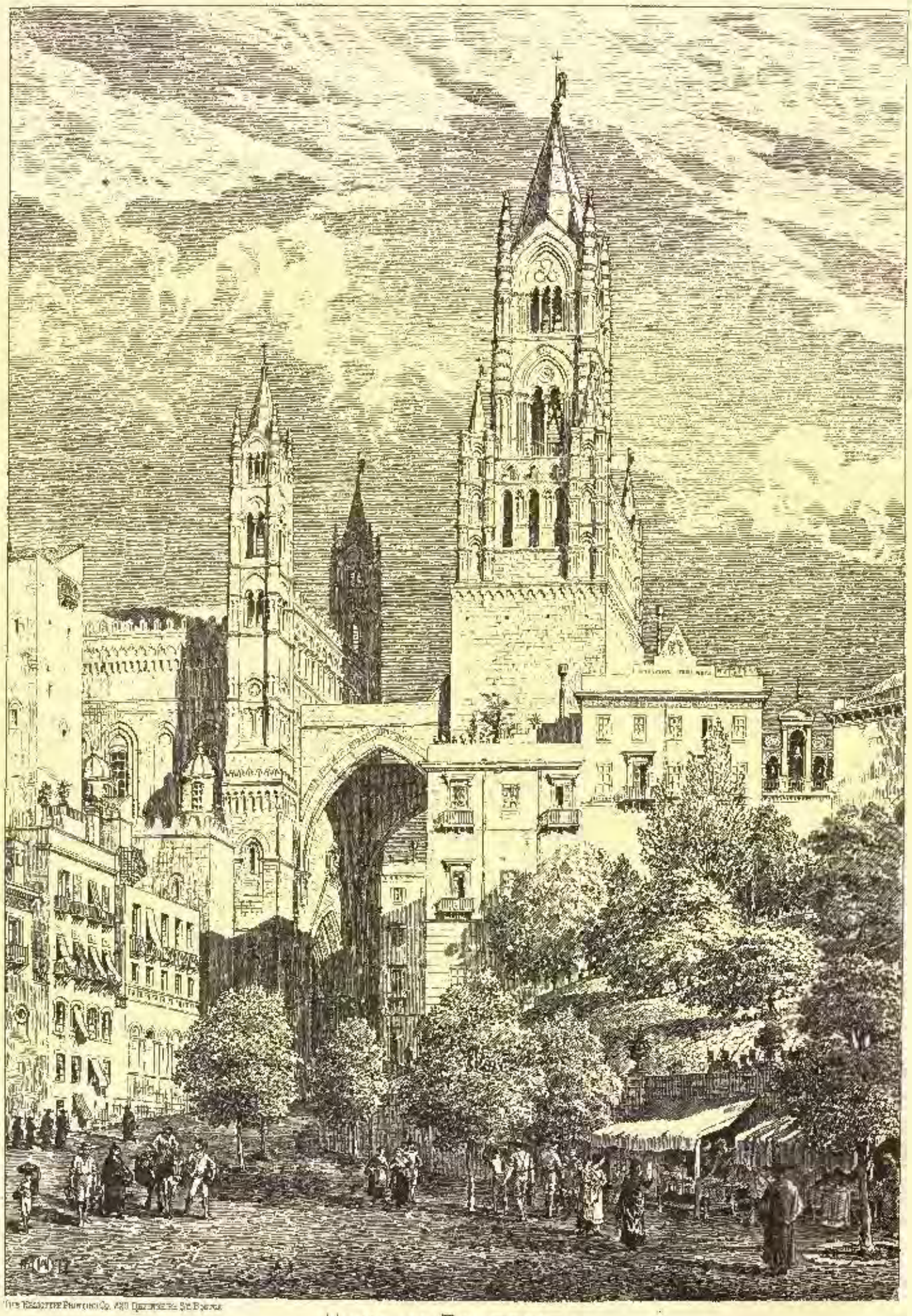
We have prepared the following report upon the twenty-three designs which were sent in for the second competition, of which two have received prizes and two "honorable mention."

"*Midnight Oil.*" This is a careful design in late English Renaissance, the main feature being the opening of the bay, which is treated with an open screen composed of a wide elliptical arch in the centre, the impost of which is a full entablature forming the lintel over two narrow, square-headed side openings. Having been illustrated in our pages, it does not require description. The design is elegantly conceived in detail, sufficiently original, faithful to style, and well executed. The committee thinks itself justified in awarding to this the first prize. It has the merit of embodying the essential features of the style without its affectations, and gives evidence of academical training in the author.

"*A Rough Sketch.*" This is a design in the prevailing style of the seventeenth century. It is *mainly* illustrated by an over-furnished interior, the details of which, however, are spirited and well designed. Its chief defect is one shared by much of the best modern work, — a crowding of *motifs*, and a consequent loss of dignity and repose. Thus, the wall surfaces are divided horizontally into dado, screen, and pictured frieze, the latter having a broad belt below it decorated with china plates, and above it a narrower subordinate frieze highly enriched with architectural details — five distinct belts or features in all, an amount of design which even the height of fourteen feet is insufficient to carry. The opening of the bay is a full arch, and the walls of the bay are filled with the conventional heavy sashes. Considering the limitations of the problem, however, the bay is not of sufficient importance or interest; but the composition is pictorial, and is rendered with a spirit which we should like to see emulated by our draughtsmen. This design is accompanied by an exterior façade, of good effect in its present geometrical shape, but a perspective view would reveal some essential defects: thus the projection of the main cornice is not accounted for where it is stopped by the crowded details which surmount the bay-window, and the bay itself has no apparent support. The committee has awarded a prize to this interesting sheet.

The two compositions which we have thus noted were reproduced in the *American Architect* for April 6th, in which also appeared a design marked "*B*," inclosed in a circle. The committee has distinguished this with an "honorable mention." This is shown in an effective perspective, in which the opening of the bay is exhibited square, flanked by cabinets built into the walls of the room, the whole occupying the entire end of the apartment, and recalling somewhat too distinctly a study by Talbert. The style is modern Gothic temperately treated, with panelled ceiling, the bay opening being flanked by thin chamfered pilasters and decorated with drapery. The composition, on the whole, is pleasing, but without marked originality. The windows or lights in the bay are separated by thin mullions, which, however, project inward sufficiently to accommodate shutters and fixed seats between, — an arrangement quite too narrow for comfort as regards seats, and quite too thin for good effect as regards depth of mullion, but the difficulty of the device is met with ingenuity. The cabinets call for greater delicacy of detail.

In the same number was also reproduced the composition which appeared under the signature of "*Fiat, fiat,*" if we interpret aright the somewhat undecipherable script. This is a study, in conventional Gothic, of an octagonal



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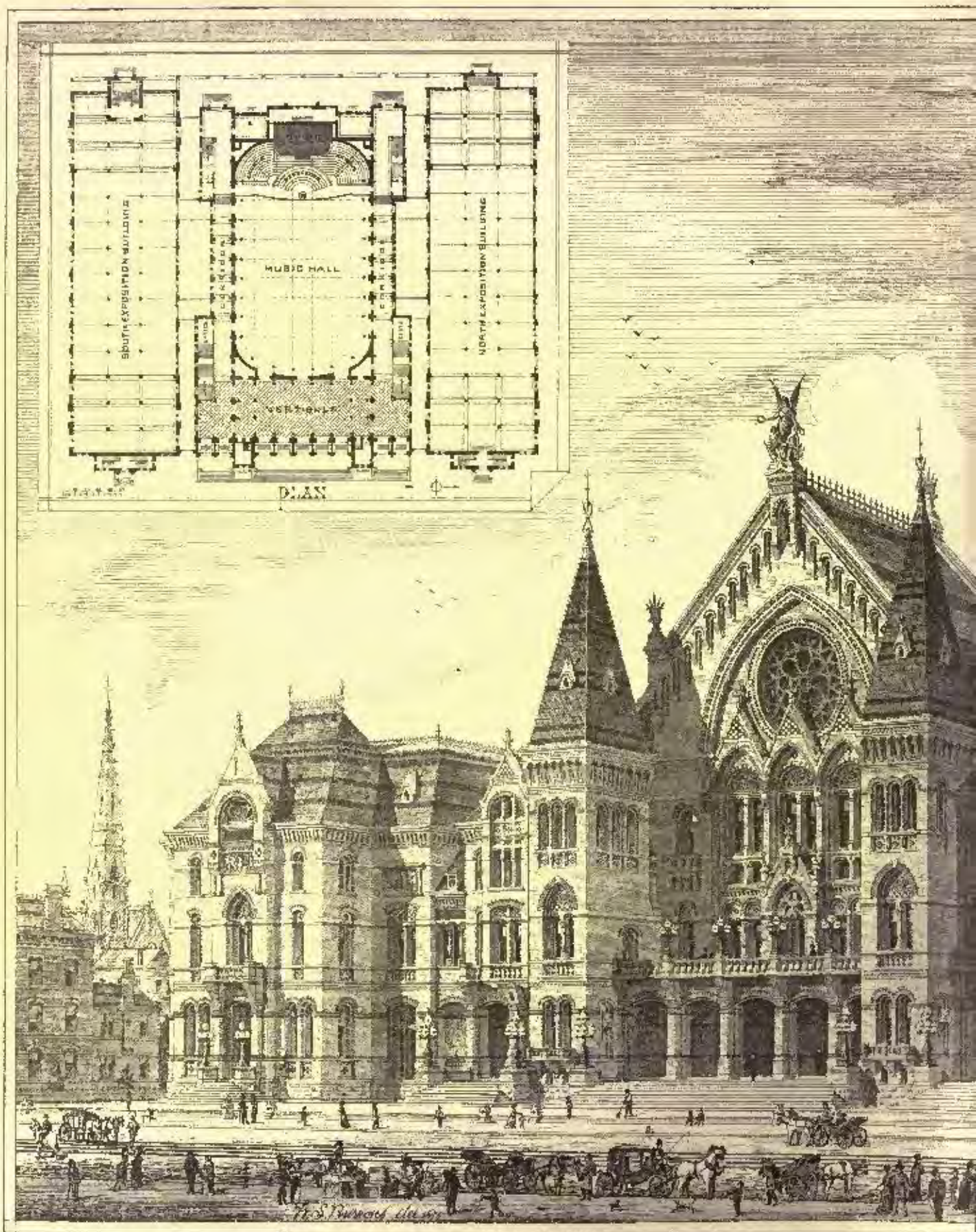
VIEW IN PALERMO



SPRINGER MUSIC HALL AN

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EXPOSITION BUILDINGS. | HANNAFORD & PROCTER, ARCH'TS.

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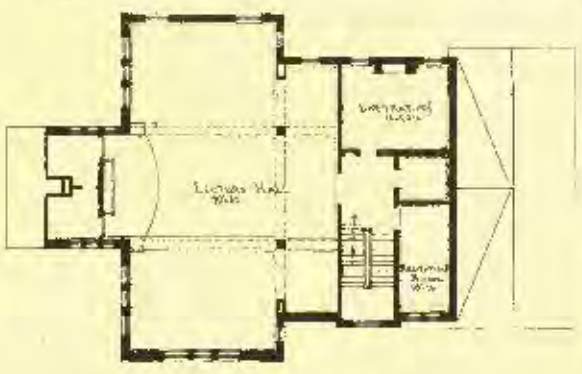
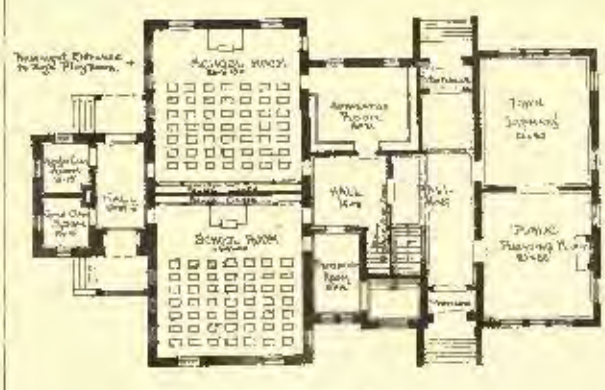
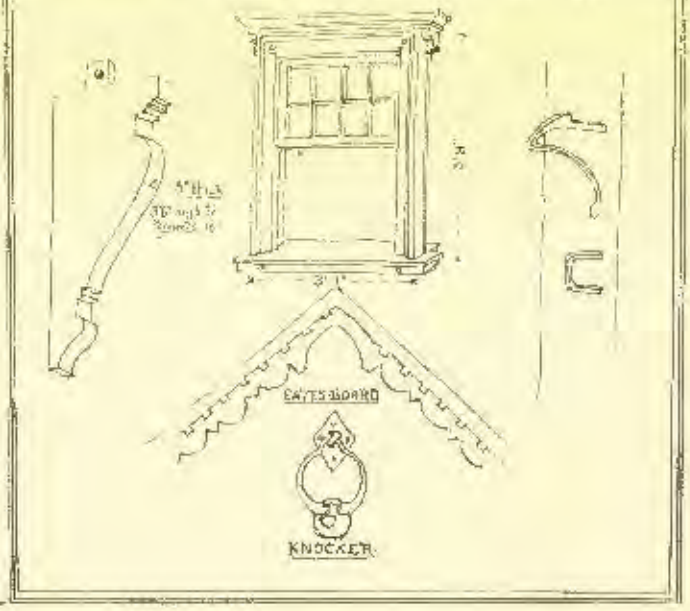


— Second Story Plan —

— Dickinson School —
— Deerfield Mass —
Treasury & Stearns Archts
Boston.



First Story Plan



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bay, intelligently drawn, the only feature of especial interest and originality being the treatment of the lintel over the opening of the bay, which appears in the form of a light open metal frieze, continuous with the lines of the frieze in the room: but the former is merely a frame for stained glass, and above it is a carved cornice decorated with flying storks. The wall screen is fairly designed, so far as regards the suggestions of the lines, but the exterior is crude and needs study. A full interior elevation would have been more effective, and would have revealed the intentions of the design better.

"*Ars longa, vita brevis est.*" This is a square bay, of no especial architectural merit, but notable for a very delicate and effective treatment of decorative detail, which is cleverly adapted from Chinese and Japanese work. The design owes absolutely nothing to its architecture, but its characteristic furnishing is refined and consistent. Oriental work like this is singularly incomplete without color, but of this element the drawing gives no indications. The design was considered worthy of an "honorable mention."

"*At the Eleventh Hour.*" This design, which was reproduced in the *American Architect* of April 13th, is a rather heavy rendering of the domestic architecture of the last century. The bay is square, and its jambs project three or four feet into the room, forming narrow side bays, each having its separate window. The central bay projects outward to about the same extent, and the opening of it is decorated with a full arch with rather clumsy architectural details. This arch, though heavy, has no function of support. There is a chimney and mirror in the centre. The leading idea of the composition is good, and the drawing bold and effective, but the accessories need study. We should have been pleased to see the line of the iron beams, which do all the work of supporting the superstructure, recognized in the ceiling of the bay.

"*Discipulus*" has produced a double bay, — a semi-circular oriel projecting from a square, an arrangement the exterior of which is satisfactorily explained in a small perspective sketch. The interior of the bay is executed in stone; it is covered by a segmental arch supported on each side by carved piers and open columns; under the arch is suspended a little gallery, which facilitates the decoration of the tympanum by plates and pottery. These are the essential features of interest in the design, and in the conception they are features of genuine originality and invention; but they are very crude in detail, and in rendering show want of practice, knowledge, and care. It is to be noted, however, that, in respect both of rendering and of composition, this design exhibits qualities of considerable promise in the author, — more, indeed, than is shown by many of his competitors who have committed fewer technical errors of drawing and design.

"*Auction.*" This is a laboriously executed line drawing, showing a design of exaggerated massiveness and breadth, all the features of which would be better suited for an interior if reduced to at least half of their present relative proportions. A want of scale is no unusual fault in this competition, and the present design is conspicuous in this respect. The natural result is that the detail, which is wanting in invention at best, appears especially impoverished and coarse. The framing-in of the bay opening is particularly amenable to these points of criticism. Nevertheless this design has a certain well-sustained unity of character, which is a real and, we are sorry to say, a not very common merit. It is more like the work of a decorative painter than of an architect.

"*Respice finem*" shows a square bay, the windows of which are occupied by the conventional heavy sashes, but barred into small quarries like a prison, and incapable of opening or shutting. The interest and merit of this design reside in the idea of treating the bay opening like a piece of furniture, flanking it with a couple of projecting square cabinets, each of them supporting a canopy on four open colonnettes, the two canopies being connected by a segmental arch carried over the opening and framing it in. This composition, however meritorious in conception, betrays a want of practice and knowledge in detail. Its cornice, in idea, is not out of style, but the little balustrade above should have been set so as to overhang the substructure, and should have been carried across over the arch. The detail of the room is conventional and immature, wanting in study, and the rendering is scratchy. The prevalence of fixed sofas along the walls of the room is unpleasantly suggestive of railway waiting-rooms. These are not domestic features.

"*Spes*" exhibits perhaps a Venetian Gothic *motif*, and his design is notable only for the continuation of the broad panelled frieze of the room across the opening of the bay, where the panels are pierced in a pattern showing familiar subjects from Æsop's fables. The drawing and composition betray an unpractised hand and mind, though the execution of some of the detail shows fair draughtsmanship. A coarse wood like chestnut should not be associated with fine-grained woods like cherry, ebony, and holly in the dado. In this, as in nearly all the rest of the designs, the want of training is evident.

"*Lucas*'" design needs more explanation than is vouchsafed in the details, and he has not followed the prescription in respect to size of sheet. The piers of the window and the jambs of the bay-opening are decorated with similar engaged terminal pilasters, in the Jacobean fashion, and the cornice and ceiling of the room are continued in the bay. This is the only design with at least some form of lintel or arch over the opening. The pilasters are well designed, but they need sympathetic and congruous accessories.

"*Etudiant.*" This study appeared in the *American Architect* of April 13th. It is a polygonal bay with seats all round, a plain segmental arched bay-opening, showing masonry, set in a wall treated with the familiar alliance of dado and superdado, frieze and sub-frieze, with screen surface between. The idea of color is recognized by the note that the room is to be furnished in "peacock blues and greens," and the feathers, eyes, and plumage of this decorative bird are conventionally reproduced in the painted panels of the superdado. The wall design, as it appears in the drawing, is ambitious, and shows thought, but the success of it is vitally dependent on the delicate adjustments of colors. As regards the masonry here shown, it is to be observed that it is extremely difficult to introduce building stones into a decorated interior like this without a certain sense of incongruity, which betrays itself especially where it becomes necessary to stop the stone and begin the wainscoting or wall lining. There are good points in the rendering of this street.

"*Diavolessa*," whose contribution also appeared in the *American Architect* of April 13th, gives us a square bay, abundantly opened to light, and divided by fluted or channelled mullions and transoms treated with rosettes at the intersections. The opening of the bay into the room is framed in like manner, — square without mouldings. The design is mainly dependent upon some well-drawn but not original drapery, with a fringed valance across the opening. Each light of the windows has a small "glass curtain." The wall surfaces in the room are treated in the vermicular Jacobean, as shown in the English books, the main feature of interest, perhaps, being the decoration of the mullions in the friezes with China plaques. There is some good work with the pen in this design, but the author has not escaped the pitfall that lies in wait for all who work with a fine point, — scratchiness.

"*Henry V.*" makes his appearance in a delicate drawing and a design not without careful points conscientiously used. It is a square bay with transom-lights in color, the opening into the room appearing in the form of the familiar segmental arch of masonry supported on a stone corbel, designed in the manner of the French Neo-Grec. But the difficult point of the jamb treatment is not properly explained in the plan. The transom lights are divided by balusters, and the corners of the bay are occupied by bric-à-brac shelves. The walls of the room have arras or wall-hangings suspended from a rod, which also is carried across the bay-opening. The exterior is weak of the lightest treatment. This part of the design is especially meagre and timid; but the sheet contains ideas enough to make a formidable competitor in "*Henry V.*," if he had some of the vigor of his namesake.

"*Verges*" gives us a square bay, separated from the room by an over-bold, low-browed, segmental arch, of impossible masonry and monumental proportions. The cornice of the room is congruous with the bay in respect to massiveness, but like the bay quite out of keeping with a domestic interior. The motif of the design is coarse, but masculine and bold. If "*Verges*" and "*Henry V.*" could interchange ideas a little they would be mutually benefited. Where does the former intend to stop in masonry?

"*Deux.*" An octagonal bay, wanting in architectural character, and without invention in respect to constructional design. Like two many of these competitive studies there is more upholstery than architecture displayed in it; but it has some fair bits of rendering. "*Dieci*" may study with profit the more academical designs first named in this list. The heavy ceiling-beams, which abut against the wall over the jambs of the bay-opening, should have been provided for in the architectural treatment of this part of the design. A practised designer would have gladly recognized this as a feature in his study.

"*Exergue*" gives us a study of upholstery in a bad style, with preposterous architectural details, especially in the profiles of the cornices. The drapery is ingeniously contrived and provided for in some respects, but it conceals and defies essential architectural lines, — a fatal error in a study of decoration: thus the cornice of the curtains, with their heavy "shaped" valance and festoons of ropes, is carried around against the windows on the line of the impost, above which arises, incongruous, a certain massive tracery in the heads of the pointed windows; what supports this tracery is unhappily concealed by the drapery. There is a pretty conceit of crowded cherub heads in the glass filling of this tracery, and some of the details are very carefully drawn.

"*Persévérez*" design comprises a bay with canted corners, and a fireplace under the central window. The bay opening is an open screen-work of ecclesiastical design, profuse with quatre-foil and copy executed in timber, with heavy chamfered timber trusses supporting ceiling-beams: and there is a strangely composed frieze to the room, without any cornice. The composition is immature, but not entirely illiterate, and the drawing, though weak, is careful. The designer needs to study his scale and to compare his work with that of some of his competitors, especially those first named in this list. His accessories are not domestic; his dado is too low and his frieze is too high.

"*Alpha.*" This is a corner bay, contrived with some ingenuity, and executed in mediæval masonry within and without, as if arranged for a castle of the fourteenth century. It is drawn with a vigorous pen, and without enslavement to the fatal straight edge. In this regard we would commend the style of this draughtsman to the careful consideration of the greater part of his competitors, who are afraid of venturing into the sea of free-hand drawing. The design is crude, and abounds in honest errors, but like that of "*Desciples*," before mentioned, it is fertile in good promise. This wholesome enthusiasm, when directed and controlled by study, will bear fruits.

"*Roger Williams*" gives us a correct and formal design, academic in intention, with studied detail, but, by reason of a certain painful monotony, uninteresting and stiff. It is carefully drawn, with too much of the straight edge, however, and, as a natural consequence, is colorless and wanting in accent. Its effect depends entirely upon the frequent repetition of a pilaster decorated with coupled terminals.

"*Ben Trovato*" and the author of the design distinguished by a trefoil in a circle are evidently too unpractised and too little versed in the rudiments of composition to make a successful struggle for the present with their competitors; but their attempts are brave and commendable, and the studious comparison of their own work with that of their competitors will be more precious to them as an acquisition of knowledge and experience than if they had received civic crowns.

MR. GARDNER'S HOME INTERIORS.[1]

There is a touch of levity in Mr. Gardner's clever writing which will attract some people, and may offend others as incompatible with a serious practical subject. His positiveness of statement and his unsparing way of putting aside many common notions may also give offence to some, but his lightness of manner defends him from any appearance of arrogance, and tends to disarm serious criticism. The book simply aims, like the author's other two volumes, to give in an off-hand way, under the guise of conversations or correspondence, sensible advice upon a subject which is attracting the attention of innumerable people nowadays, — the finishing of houses. The author's ideas are the accepted ones about a straightforward, common-sense, and natural adaptation of materials to use and convenience, with very little respect for precedent or convention, and little notice of styles, excepting a reference to some which he opposes. One might read his book without imagining that there were any such things as styles of ornament or received rules and traditions in art; in fact, without even suspecting that house decorating was at all a technical matter, or an undertaking that could not be carried on, by the light of nature, as well by one person as another. This, however, may do no great harm, and the architect will simply regard Mr. Gardner's book as familiar letters to help the laity in matters about which they would naturally have a voice, whether or not they were in communication with a professional adviser.

The book deals with most of the interior details of a house: floors, walls, and their coverings, doors and windows, staircases and ceilings, fireplaces and finish. In its treatment, as well as in its manner, it is plain and simple, and suited to the use of people of moderate means; at least it suggests only simple and inexpensive appliances, making no mention of marbles, stained glass, carvings, hangings, inlays, and other costly devices, nor does it go into the mysteries and delights of furniture or bric-à-brac, thus avoiding the dangerous ground on which other recent treatises have ventured. Mr. Gardner's advice is always of a practical kind, touching upon exigencies which are continually occurring, and for which amateurs are not likely to be equipped. He writes with ready in-

[1] Home Interiors. By R. G. Gardner, author of Homes and How to Make them, Illustrated Homes, etc. With Illustrations. Boston: Houghton, Osgood & Co. 1878.

vention and much fertility in ingenious devices, with a bold, incisive common sense which makes him ready to strike out unhesitatingly from the common path, but keeps him from running into any great extravagances. At the same time he has an eye to picturesqueness and to general effect. He evidently enjoys tilting at notions that are consecrated because they are habitual, and likes to let off his little paradoxes on conventional ways. His tirade against blinds and his chapter on doors give a good idea of his liveliness, his sense, and his excesses. We quote the following:—

"Please to understand and remember this supreme decision: outside blinds have no rights that white folks are bound to respect. They are simply screens to keep out sunlight. They may be nailed up, screwed up, tied up with strings, hinged at the top or bottom, sides or centre, cut in two, doubled up, chasséed down the middle, shoved to the right or left on rings or rollers, — anything to accommodate the windows. My advice is to put them only where the summer sun is most intrusive, and if it happens that these will not open conveniently, let them lie in the attic, except during the hot weather, when you do not care to open them fully. If, for the sake of seclusion, you must have shutters for all the windows, hang them inside and provide with bearings into which they will fold when open. I forgot, — you cannot afford inside shutters with bearings. Well, don't hang them without; they would make the room look like a cheap school-house or a restaurant. Venetian blinds are pretty and accommodating: they will slide up out of sight or down over the entire window, the slats will roll and remain at any desired angle, and they never quarrel with the curtains."

And again on doors: —

"If I ever should be sat upon by coroners, I think the verdict will be 'died of doors.' They are my *bête noir*. They worry me beyond measure. The square, stiff, selfish, inhospitable, uncompromising things. Harsh in character, and ugly in design. They always suggest the telegraphic alphabet, — a long panel and a short one, one short and two long, two shorts and one long, three shorts, a short between two longs, a long between two shorts, and so forth *ad infinitum*. Then they are so heavy and obtrusive, if wide enough to allow two persons to pass through abreast, which they seldom are. . . . A swinging door, three or three and a half feet wide, monopolizes thirty or forty square feet of wall space, and from fifteen to twenty square feet of floor room. If it is four, five, or six feet wide, as it often ought to be, how much is there left on the side of a sixteen-foot room for furniture or pictures? If there happen to be two or three such doors, — I have seen small rooms with half a dozen, — 'kept in-doors' describes the condition of the inmates most accurately. To speak mathematically, five three-feet doors opening into a room fifteen feet square, cover, absorb, sequestrate, and totally demoralize just thirty-three per cent of the whole apartment."

Of the prevailing craze for sticking tiles about he says: —

"Separate tiles are sometimes very beautiful, well worthy of being set up as ornaments, like vases or other pottery, but there is certainly an incongruity in using them as decorations for wood-work, in situations where their durable quality is of no value. Inserted in the top of a side-board, a heavy table, or a wooden shelf, either to cover the entire surface or for an ornamental border, at the base of a newel post, next the fire in a chimney-piece made of wood, and in various other locations, their hardness justifies their position; but they should not be set scattered about 'promiscuous like' in pilasters, corners, and prominent places where they have no meaning except by reason of their color and pattern. This is worse than new cloth on an old garment; it is like a castellan fence around a country door-yard, a binding of brass on a velvet gown."

It is not to be supposed that all problems and opportunities that will occur in house-fitting can be touched upon in a small book, and those who should look in this one for a *vade-mecum* that would give them complete directions would be disappointed. But the non-professional reader will find in it many suggestions which will give him new light, and clear away, we fancy, a good many unnecessary notions, while the professional will find much of his own experience entertainingly set forth, and perhaps get here and there a hint worth his notice.

The illustrations are less interesting than the text. The lively pencil that relieved Mr. Gardner's earlier volumes with sketches of figures and scenes has not touched this, and apparently the hand which before made the practical designs has here also essayed the jocose ones, but without adding anything to the attractions of the book. These sketches are not germane to the subjects of Mr. Gardner's books, and the only thing which justified their introduction in the others was a certain lively grace and sparkle that was in them. One accepted them as one accepts a guest who has no warrant for coming, but who has a knack at making himself agreeable. In those of this last book this excuse is lacking. The illustrations which have to do with the purpose of the book are a little more simply drawn than before, and perhaps appear to better advantage for being spared the contrast of their cleverer neighbors. They are simple, serviceable diagrams, sometimes of interesting design and sometimes not, generally well enough drawn and to the purpose, though sometimes a little lame, as at p. 251, or at p. 117, where curious blunders in perspective give a queer look to the picture.

We close with one more quotation: —

"Most men are more intimately affected by the character of their homes than by the potions they absorb, whether doctrinal, legal, or medical. It is true, 'homes' and 'homes' are not identical, but the relationship is very close and peculiar. In studying for a plan or for counsel, I confess my inability to draw the line between the material and the spiritual, the economical and the moral, the sanitary and the æsthetic, the useful and the beautiful."

CORRESPONDENCE.

BALTIMORE.

MARYLAND STATE HOUSE. — PUBLIC SQUARES. — SPECULATIVE BUILDING. — PROPOSED BUILDING LAW.

MUCH interest has been felt in the recent controversy concerning the repairs upon the State Capitol at Annapolis. Two years ago the legislature, after consultation with Mr. G. A. Frederick, architect, of this city, and on the basis of an estimate made by him, after a careful examination of the structure, appropriated $32,000 for its repair, specifying in detail not only the particular work to be done, but also the several amounts for each item. On the assembling of the present legislature, it was found that not only had the appropriation been exhausted, but extensive repairs, never provided for and costing $79,000 additional, had been made by the Board of Public Works. New fresco, furniture, and upholstery had cost $36,000, or $4,000 more than the appropriation. As an example of the manner in which the building was furnished, the duty alone on the raw silk used for curtains was said to be $2.00 per pound. Nor was this all. The architect submitted with his report an estimate that $25,000 is still required to finish the work, making a grand total of $136,000, for which the citizens of Maryland have the satisfaction of beholding the venerable building, in which Washington resigned his commission, stripped of all that remained dear to the lover of antiquity. Even the gallery in the historic Senate Chamber, where sat Mrs. Washington, and which is represented in the large painting in the rotunda of the United States Capitol, has been removed. The wide, old-fashioned fire-place is closed, and the picture of the resigning of the commission is hung where the mantel formerly came. In gazing on this picture and then on the reality one can readily understand why the faithful old orderly weeps. How much better to have preserved this historic building in its entirety, with only such repairs as age had made necessary. It required, a new building ample for all needs could almost have been built for the sum worse than uselessly expended. Some opposition was made in the legislature to paying the bills thus contracted without warrant of law, and an "investigation" was had, the verdict of "no one to blame" being practically rendered by the majority, and the bills ordered paid, with the exception of $1,700, the architect's commission on furniture, and one small account. A minority report was made, however, characterizing as "extravagant and unwarranted so large an expenditure of public money."

A radical change has been made in two of the squares at the Washington Monument during the past winter. The work challenges public criticism now that the finishing touches are being put to it. The iron railings are all removed and the squares laid off with a minimum amount of grass plot, and a maximum of "Wud" cement pavement in three colors, much of which, by the way, has been already relaid. A large quantity of cut North River blue stone is used for edgings and curbing, rock-faced brown sandstone and light stone, chisel-dressed, is used in dwarf walls and miniature fortifications, surmounted by wrought-iron railings and lamp standards of the most pronounced Queen Anne design. In one square is a truncated cone of polished white marble, about nine feet high, upside down, and aptly compared to a locomotive smoke stack. Ornament this with a few sunk beadings and imagine a stork and reeds on either side incised in the stone, and we have the fountain, from the summit of which the water falls with a melancholy drip, discoloring all below it. As a thoroughly incongruous and unmeaning piece of design, and withal very expensive, these squares are thought to bear off the palm.

Another park of sixteen acres near the northern boundary has just been accepted by the city, having been tendered by several public-spirited citizens. It is unrivalled for such a purpose, containing noble forest trees and several fine springs, and will doubtless give an increased impetus to first-class building in that vicinity.

The mania for erecting long rows of poorly planned and miserably constructed houses is perhaps slightly on the wane, though the nearly total absence of any building laws tends to encourage it. For more than two years the Baltimore Chapter of the A. I. A. has labored in vain. It has submitted an ordinance which was subsequently modified by the city council committee, and formed a subject for conference between them and a representation of the architects on Wednesday last. Each section of the proposed new building law was taken up in detail and explained. The matter at present looks more favorable, and though not by any means complete the law is far better than the existing condition of affairs. Its early passage is devoutly hoped for. CIVIS.

PHILADELPHIA.

BONUS BUILDING.

IT had come to be a subject for reasonable hope, owing to an improved temper in business circles, that first-class building would revive, and the speculative operations known locally as "Bonus" would get a start on the downward path. The term requires only the substitution of *g* for *n* to express the real nature of a majority of these operations, which sap the life of legitimate building enterprise. The system, as it now prevails, is born of inflation, and is conducted by those who became capitalists during the war. I presume the method exists under different names in other large cities where there is a fast increasing population, and where an apparent necessity for the increase of homes can easily be argued into a real one. As the plan of proceeding may be different with us, it may not be "coals to Newcastle" for many of your readers. A man may have a vacant lot which he desires improved. If he does not already possess one he need not wait long, he can buy it. He will seek out some impecunious mechanic, who has as little reputation as capital to lose. He will sell him the ground and give a deed, taking a

mortgage for the full value and perhaps beyond. He will also agree to advance money on the prospective houses to be built, generally about one third or one half what a decent, well-built house of the size proposed should cost. The advancer can then retire behind the scenes and watch the movement. The puppet, or accomplice, as the case may be, makes his contracts for work and materials. Often he is an easy man to deal with. He does n't higgle long about prices. Why should he? There is margin in the job and he will not beat down the material-men. Their name is legion, and among them many catch at the bait. They must do it. There is nothing else to do. Perhaps the builder is duped; he may wish to deal honestly, he may have thought that the tide has come in his affairs and he honors the benevolent capitalist who holds out the hand to help him. The material-men require the guarantee of the advancer. He is reputed wealthy. The contracts for the first instalment are closed. The builder's order, accepted by the advancer, secures the payments at certain stages of the work. The buildings go on. The first joists are reached, the first advances are paid, and the "operation" is in good credit. The material-men are encouraged and perhaps less vigilant. Further contracts are made, without security, if the victim is fresh; with security, if he is a "burnt child." The next stage is longer in being reached. The builder finds or has known all along that his advances are inadequate to carry the work to a successful termination. He must get out of it in some way. He buys wherever he can, pays for what he absolutely must, but gives the reputation of the advancer for most of it. The further he progresses the more deeply he flounders in the mire. Perhaps he becomes disheartened, and abandons the operation to its fate when one third completed. Orders are out for a great portion of the material yet needed to finish; much of it is delivered and irrecoverable. Where is the advancer? He does n't know anything at all about it. There are orders out, to be sure, but they are payable when so and so is ready. You have your redress, good Mr. Creditor, put on your lien." To indulge in the formality of putting on the lien is generally to find that to bring the ground and half formed buildings to a sheriff's sale would not realize the amount of the first mortgage. Either the heaviest creditor must become the purchaser, or they are knocked off to the capitalist at the amount of his mortgages, and the creditors can go hang; he releases himself from the payment of the orders due when the building has arrived at a certain stage which he never intended it should reach, under the first contractor, and at his leisure he perhaps completes the houses, puts them on the market, sells them at far more than such shells are worth, and gives thanks for a plentiful harvest. Sometimes an understanding exists between builder and advancer by which the former is employed *not* to finish the houses. They are often, however, pushed to completion, and the materials bought as best they may be, but nine times out of ten are not to be paid for. Hundreds — thousands of honest men are suffering in our city to-day from having builded upon these foundations of sand. Hundreds of men, far from honest, are living in luxury upon the wrecked fortunes of the sufferers. Thousands of houses are unoccupied because the market is glutted. The bounds of the city have expanded beyond the needs of the city's population. Men of former wealth are seeking more economical houses, and men of once moderate means are swelling the register-list of hotels and boarding-houses. As far, then, as first-class building may be looked for to supply homes, the chances are small for its immediate revival. J.

NATIONAL ACADEMY OF DESIGN, NEW YORK. FIFTY-THIRD ANNUAL EXHIBITION.

Criticism in detail of a picture-show can only be valuable to such as have the pictures at hand. But the general tendency of the year can, perhaps, be marked so as to interest even those at a distance from the National Academy.

More than ever before it merits this year the epithet "national," for its list of names embraces many States. Foreign artists are, on the other hand, in less force than usual, the European addresses which follow so many names denoting almost invariably Americans studying abroad. The catalogue is long, including over seven hundred paintings, while the statues are insignificant in number and — in their entire want of excellence — very significant indeed in quality. Critics of last year's show assert that this is inferior, but to one who has not visited the Academy since the spring of 1874 it seems a great advance. Works of genius, even of very great merit, can hardly be cited, but the average in commonplace is higher and there are fewer canvases which disgrace alike exhibitor and exhibiting committee. Most strongly impressed is one who is a stranger to the work of the last few years by the great number of new names in the catalogue, the strength — numerical at least — of the very youngest generation of American artists. It is to these, not to Academicians nor Associates, that is due the rise in the average of work. If one were asked to point out some of the very worst pictures in the seven hundred, pictures distinguished by lack of every necessary quality, by lack of drawing, color, manipulation, and imagination, even of sense of what can with any propriety be made a subject of art, the major part of the names would be followed by the N. A. of supposed distinction. Not that N. A.s paint worse than any one else, but surely no one else can paint worse than some among them. It is not easy to find worse pictures than the "Child's Portrait (No. 432) by Mr. Chapman, or the medley of orange and lilac and pink which Mr. Cropsey calls "Cedar Lake," or the "Sunday Lesson" of Mr. Guy, or "Little Sunshine" by Mr. Whitehouse, or "Leisure Moments" by Mr. Pratt, or the unutterable "Idling" of Homer Martin. All of these are Academicians, as are Mr. Geo. H. Hall, the colors of whose large and pretentious pictures make them look most like the ubiquitous "scrap-picture" many times magnified; and Mr. Baker, whose unnaturally pink flesh tones and staring draperies grow worse year by year and neutralize the good qualities he possesses; and Mr. J. G. Brown, whose large "Pull for the Shore" is glaringly disagreeable and false; and Mr. Eininger, whose "Twilight at Pan" is curiously unnatural. Mr. Winslow Homer is too well known to need describing, but he has never done anything harder and more unpleasant than his "Shall I tell your Fortune?" — to mention the worst of five or six. Mr. Loop's ideal figures, "Marina" and "Hermin and Helen," are of the feeblest.

To set against such sins as these we have much commonplace work such as the Academicians have given us for years past, — neither better nor worse. And as positively good we may reckon Mr. Huntington's portraits, faithful and gentlemanly, if not strong or especially artistic; some of the works of Mr. Samuel Colman, of Mr. David Johnson, of Mr. William Hart, injured by over-bright color, and of Mr. Magrath. Mr. Geo. Inness's pictures are very startling and will scarcely add to his reputation. Certainly, however, none of these show anything very important. Mr. LaFarge — one at least who has the merit of not allowing himself to be classed with any other man — is so inadequately represented by three small, unfinished studies, that one's curiosity is but whetted. His "Father" shows such wonderful work in the wet clinging of the semi-transparent drapery, that we rebel at the slurring of the exposed parts of the figure. Much the most marvellous bit of painting in the rooms is still but a bit, a study, not a picture. The curiously fascinating little "Andromeda" shows another study of similar drapery, damp this time, not wet, wind-driven about the limbs, not clinging to them, and is almost as marvellous as the others. I am not the first to say Mr. LaFarge runs danger of being spoiled. One can but pity an artist when a critic describes a sketch of a couple of figures under a pine tree as "indisputably full of religious sentiment," and finds reason to congratulate himself for the vagueness of the "Father," it being thereby proven that "we have at least one artist who seeks."

If we leave the full-fledged for the callower Academic brood, we shall see the Associates doing some work quite as good as the Academicians proper, and some almost as bad. In the former class we must rank Mr. Eugene Benson's work, Mr. Swain Gifford's, Mr. Van Elten's, and Mr. Gay's; in the latter class Mr. C. G. Thompson's pictures, Mr. Scott's "Meditation," Mr. William Morgan's "At Home," Mr. Story's Portrait (No. 638). These cannot be surpassed by the failures of their seniors. Mr. Reinhart's "Katrina Van Tassel," painted, most unfortunately, in oil "gray on gray," is very poor, as is Mr. Ogilvie's "Mountain Brook," Mr. Powell's Portrait (No. 539), Mr. Pope's "Waiting for Papa," Mr. Lay's "Two Friends," Mr. Scott's "Clemance Lenorville," and Mr. Wood Perry's "Story." The "Star of Bethlehem," by Mr. Chapman, N. A., and "Mother's Goodnight," by Mr. Thompson, A., are two pictures that might have been painted in the very infancy of American — or any — art.

Mr. Tiffany scarcely fulfils the promise of his earlier work. His *technique* in oils does not improve, and in one picture, "A Laborious Rest," where he leaves his usual subjects and gives us foliage, he seems to be seeking the pale effects and fluffy texture we know in Mr. Boughton.

Passing now to the outsiders, we halt first at the most familiar name to find Mr. Thomas Moran confiding ever more and more in the fact that his pigments are pleasing in themselves, less and less to the way in which he applies them or to their actual existence in such a way in nature. His "Dream of the Orient" is childishly absurd.

It is with hope for the further future that we look from the elder, titled generation to the newcomers, who give us most of the best work on the walls. Mr. Shirlaw, the president of the new "Society of American Artists," is successful in his portrait of himself, which, if rough, — I mean esthetically, not technically, — is unaffected, strong, and lifelike. His life-sized "Bather," the most ambitious picture on the walls, but one of the least pretentious, is clever in the outline drawing, though the modelling is not always satisfactory. In spite of its seeming more properly a study of flesh-tints and pose than a picture *per se*, it is heartily welcome as showing we may yet dare to attempt — and perhaps achieve — the highest. Mr. Chase, whose "Ready for the Ride" was the finest picture at the new Society's exhibition a month ago, sends "The Court-Jester," an infinite falling-off, a clever picture, but not a beautiful nor a pleasant nor a powerful one, somewhat coarse both in conception and execution. The effect of the face — in itself too bestial — is distracted from by being so prominently reproduced in the head on the jester's bauble. Mr. Schmitzberger of Munich — whether native or American, I do not know — sends a very clever canvas, still life with dogs, in which the broad, blunt touch, so popular just now in Bavaria, is pushed to the extreme. Mr. Gross and Mr. David Niel, both of Munich, also, send some clever study-heads, Mr. Niel's having much

actual beauty and the promise of an excellent touch. It is one of the best things at the Academy.

In portraiture is prominent a portrait by Mr. B. C. Porter of Boston. The color is attractive and rich, the figure well and simply posed, descending a staircase. The picture's greatest merit is decorative; its greatest fault lies in the manipulation of the flesh and the want of life. Compare it with the great unwieldy canvas over which Mr. Huntington has spread his "Portrait of a Young Lady," and we shall see its superiority as a picture, both in composition and in color. But compare it with Bonnat's portrait (No. 442) and we see its inferiority as a reproduction of live humanity. One feels it, by the way, rather a lucky chance that the Academy shows us Bonnat's picture at all, for it is "skied" over a door. It is defiantly simple in pose and want of color. Dark hair, a severe black dress with a single pale flower and an unvaried blackness of background, from which the face, bust, and arms glow with almost exaggerated whiteness. There is none of the successfully elaborate decoration of Mr. Porter's picture, but there is life, style, force. One who desires "characteristic art" must be amply satisfied with this picture, for if ever the nineteenth century can be incorporated in art it is here so incorporated with the utmost talent, clever, brilliant, practical, hard, and cold. Both subject and treatment are not only of the earth, earthy, — one may be that and still be tender and poetical and sensuously divine, — but of the world, worldly. It is more than trite to rail at hanging-committees, but when one sees such a picture so placed and another, a careful portrait by Henner, in a high, dark corner of the corridor, where it cannot possibly be examined, one doubts the Academy's sense of courtesy to foreign artists of reputation and sense of obligation to the public as well.

Mr. Alden Weir's portrait of his father is well done, but it is a pity his brother consented to paint such a costume as that worn by the young girl in his No. 437. Mr. Anderson's large portrait (No. 189) must lower in any one's eyes the dignity supposed to be conferred by the fact that a canvas has been a "*Salon* picture." Miss De Kay's head, which she calls a "Young Mother," is meaningless and ugly.

We must go back to the Associates for a moment in order to notice Mr. Fuller's two pictures, — "The Turkey-Pasture" and "By the Wayside," certainly original and clever and as certainly eccentric. One can hardly tell in their present position whether their appearance of cleverness is caused or is diminished by the smoky color and poetically unreal light.

In landscape, Munich again sends what is perhaps the best work in Mr. Macy's pictures, — somewhat crude as yet, but good in style and giving promise of the best. Mr. Quartley's pictures are of very unequal merit. Suffering, once more, by hanging, is a fine study of a moor with running water, by Mr. Widgery Griswold, who gives one a good idea of English landscape art as contrasted with continental methods. Mr. Senat's "Stormy Moonlight" well deserves mention, as does Mr. Harry Chase's "Kullar Point," Mr. Waller's Egyptian scenes, Mr. Bricher's "Low Tide at Scituate," and Mr. W. P. Phelps's pictures owned by the "Lowell Art Association."

M. Gustave Doré's drawing for the "Idyls of the King" helps to a solution of the mystery how one hand accomplishes so much. The plate, which when engraved looks wonderfully elaborate, is done, in India ink apparently, with the most broad and rapid and facile brush-work, and may have easily been finished in an hour or two.

We miss both water-colors and architectural drawings from the Academy, except in one or two weak examples. Most of the sculpture scarcely rises above that which used to be hawked about the streets on the heads of Italians. Mr. Hartley's "Whirlwind" is impossibly inartistic. A bust of his might be fairly good were it not for the attempt again to go outside of the legitimate in the most ingenious and elaborate undercutting and perforating of pupil and iris, with the vain endeavor to vivify the eye. It will go hard with a man when he begins by totally misapprehending the nature and limitations of his art. Mr. Henning's so-called "Titania" — the only large piece of marble — is vulgarity itself.

It is never hard in such a collection as this to judge of the relative excellence of the different works. Most of them are simple, rising not at all into the region of the imagination, and tackling none of the more complex problems of art. But at the end of the long examination one's brain is rather confused as to the actual value of the best of the work, its value, compared not with its surroundings but with the highest standards. Fortunately there are usually means at hand in New York to renew one's memory of the best modern work, and to find the variation produced in one's critical compass by the inspection of seven hundred Academy pictures. Just now the absolute "true North" of landscape art is to be found in Mr. Cottier's collection, embracing the divine "Orpheus" of Corot and specimens of the best of his French and Dutch contemporaries, while figure-painting is represented by Millet in his earlier manner. It seemed at the Academy as if many touches and methods of much ingenuity had been tried with little success. Such a variety was to be seen and the sight was so little pleasing that one began to doubt whether there was satisfaction at all in landscape art, and whether recollections of the Frenchmen's power were not lying memories. It needed but one small and simple Daubigny to set the doubt at rest, — a bit of meadow, a line of trees, a glimpse of river, such a subject as hangs by the score at the Academy, but here no hint of commonplace or insipidity. This was *technique* where one did not think of the *technique*, but merely that the meadow was summer grass, and the trees trees, and the atmosphere air — not paint ever so carefully laid on. What the elaborate speckiness and complicated touch of Mr. Macy does not realize, what the washy breadth of Mr. Inness only caricatures, was here, and looked as simple as if the first beginner could do it. If Daubigny taught so much of what is possible, what can one say of Dupré and Diaz and Rousseau? Above all, what of the superb ideality of Corot's "Orpheus," as distant as the poles from the downy olive-green one sees most often from his hand in this country? Here is something more than nature, it is inspiration as well as painting. The Millets, especially the "Samson and Delilah" and the "Quarrymen," are a gauge almost as satisfactory of what modern art can produce in figures. One left the Cottier collection, it is true, realizing the deficiencies of our own art. But, *per contra*, one was cured of the despondent thought that perhaps the best was not so very good, and that nature was still far above any possible brush, and that modern art was hopeless of perfection. Our feet might lag, but we had been reassured that the goal was noble and that some had reached it.

M. G. v. R.

A PROBLEM IN ACOUSTICS.

EDITORS AMERICAN ARCHITECT.

Gentlemen: The troubles of your correspondent W. B. A. in regard to the acoustic quality of his church, may perhaps come from echo from the blank wall between the two doors leading to the entrance hall. This would be lessened by hanging cloth against that portion of the wall; the softer and looser the cloth the better. It might be well to experiment with cotton cloth hung temporarily. If this should not prove to be the source of the trouble, it is possible that echo may take place from the mass of air above the gallery, enclosed between the gallery and the ceiling. This would be partly or wholly broken up, if it existed, by stretching wires across the church, one above another, vertically above the gallery front, shifting them a little backwards or forwards till the proper place is found. The wires should not be too small, nor too far apart.

The difficulty is much less likely to proceed from this confined mass of air above the gallery than from the plain wall below, but it is quite possible that it may have some influence. The proportions and section of the room seem not very unfavorable to good acoustic quality. Although if the scale of your correspondent's drawing is correct, a little additional length would have been a great advantage.

In cases of echo from the rear wall, it is often well to experiment with the reading-desk in different positions, forward or backward, or raised a little more or less. The variation in the tension or the angle of the sound-wave at its impact upon the opposite wall thus produced has a considerable influence on the echo.

The manner of heating, I should think, would be rather favorable for sound than otherwise, on account of its uniform distribution. It may comfort your correspondent to know that any echo from plastered walls diminishes as the age of the building increases. Aside from the natural first dampness of the plaster, the gradual change of the lime from hydrate to carbonate under the action of the air sets free moisture in the pores of the plastering, which for some months renders it nearly impervious to air and adds strength to the reverberation from it.

T. M. C.

SIR GILBERT SCOTT.

SIR GILBERT SCOTT was one of those men — and the capricious circumstances of life cause them to be few — in whom a singular and instinctive genius for one particular description of art comes to be encouraged in almost every possible way by the accidents of fortune and marred by no misadventure. He was the son of a country clergyman, inheriting a name held high in literary honor. Educated in pursuance of his bent for architectural work in a plain, respectable London office, where there prevailed neither dulness nor eccentricity, he commenced practice at an early age at a time when two peculiar principles had just taken possession of English architecture — ecclesiasticism and competition. A partner possessed of special aptitudes for competition lent him important aid in that adventurous field; in ecclesiastical art he himself was *facile princeps*; and they were both but about thirty years of age when Messrs. Scott & Moffatt had attained the undisputed position of the most successful competition architects of the day, and notably in the design of churches. Although he had in time to part from the fellow-worker of his youth, Mr. Scott never receded from the position he had thus taken up: to the end of his days he was emphatically a church architect, and the most successful competitor in England.

In modern times there have been three supremely conspicuous architects in England; and, while each of these has manifested a striking individuality, there has been nevertheless a remarkable similarity of essential artistic character in all — Sir Christopher Wren, Sir Charles Barry, and Sir Gilbert Scott. We may even say that the merits of all have been eminently English. In no respect either profoundly cultivated or passionately inspired, in all cases moved by the sober impulses of sound good sense, devoted to hard work, and ever diligent in business, all these three great artists alike have won their fame by the persevering performance of an immense volume of personal handwork, endowed from first to last with inimitable per-

sonal grace. Amongst the three, Scott has had chiefly imposed upon him the task of popularizing neo-mediæval ecclesiastical art; and it is as idle to say that he has not equalled Wren and Barry in other provinces of design as it is to speak of those eminent compeers as having ever attained to his supremacy in this.

The precise position occupied by Sir Gilbert Scott for the last twenty years has been a very peculiar one. There has been in architecture, as there is in most other things, a *via media*. It has been followed, as it generally is, by comparatively weak men. Scott followed it persistently; but he was a strong man — a calm, experienced, dispassionate, safe man. While certain of his brethren were wildly and irascibly contending for the faith that was in them, he was ever serene, and, although not at all without his faith and his warm feelings — and very much the same faith and the same feelings as theirs — ever cautious, dignified, and prudent. It is quite superfluous to remark that religious symbolism, and indeed whatever kind of ecclesiastical discipline, is at any time enough to stir up irrepressible controversies and incomprehensible animosities. How much of these ungracious manifestations, even in private life, England has seen during the present generation no one needs to be reminded. It is no less remarkable how much of this unseemliness has entered into such a thing as architectural discussion. Even the weakest of men, acting as earnest votaries of the art, or only as conscientious practitioners of it, have been led away into such unwonted ardor as to astonish the observer, and in not a few cases have exhibited in their very works, almost absurdly, the perturbation of their spirit. It is not enough to say that Scott was never thus led away. The peculiarity of his case was that he acknowledged the same enthusiasm and possessed the same energy, and that it can scarcely be said he restrained himself, because he was constitutionally restrained. Not only in his writings, lectures, and addresses, but in the very products of his pencil, his intellect was full of ardent vitality; but he never permitted himself — or was never permitted by his instinct — to go a single step out of the safest path. He made no enemies, therefore, and indeed made no blunders. Opponents he had, and failures he made, no doubt, but against such a man opposition was at the worst respectfully conducted, and the memory of unsuccess left no trace.

Gothic architecture was his all in all; and the occupation of his life was church-building. How many new churches he has built, how many old ones he has restored, it is almost impossible to count. Half the cathedrals of England, more or less, he has renovated and improved. Country clergymen were the very companions of his business, and deans and chapters and learned and wise bishops his unfailing friends and admirers. A remarkable gentleness of demeanor secured every one's favor, and his sound judgment and unlarged experience seldom if ever failed to retain it. It is well known that there are those who say his work exhibited a certain mannerism which every year increased, and which must of necessity sooner or later degenerate into feeble commonplace. Experienced observers could tell his style at a glance. Apt pupils could acquire it with prompt facility. Cynical experts could anticipate his opinions and foretell his advice. All this, however, may be perfectly true, while yet it is enough to answer that much exercise had made his judgment both methodical and modest, whilst a vast fund of practical knowledge had enabled him to see the utmost variety in such a subject as religious art passing into uniformity in the end.

But if Sir Gilbert Scott had a mannerism, it was based at least upon very good qualities. Violence — which has its own place in art as in other matters — he carefully avoided. He worked to please, not to offend; to produce the smile of satisfaction rather than either the frown of surprise or the gape of amazement. His architecture was sleek, graceful, gracious; modest and unobtrusive; genial and invariably sensible. No such man could hope to retain what is called the power of original thought through nearly half a century of increasing practical labor and amidst the advancing capabilities of his own pupils and imitators. New brooms sweep clean in architectural progress as in all else, and new men are arising every year in whom new mannerisms and nothing more are the novelties of the moment, sometimes destined to success, oftener to failure. The great mannerism of Sir Gilbert Scott was a certain simple, moderate, permanent graciousness — invaluable in everything ecclesiastical — which met the advancing tide in church affairs five-and-forty years ago, and advanced with it slowly and steadily to fame and fortune. In matters wherein we are all most easily offended Sir Gilbert's churches had the rare merit of offending none of us, and indeed of pleasing all who were willing to be pleased. Some designers succeed only in distressing us by their imbecility; some arouse our indignation and distrust by their misplaced muscularity; some weary us with their finesse; it is no small merit to avoid all this and to gratify us with modest elegance.

To catalogue the achievements and honors of such a man is of itself a most interesting task, and to the ambitious aspirant in art a record of Sir Gilbert Scott's buildings might well be productive of a feeling of no little astonishment. Besides churches by the hundred, ranging from the wayside chapel to the abbey and the cathedral, there are as many ordinary public and private buildings as go to make a lifetime's work for men of common capacity, whilst the noble railway edifices of St. Pancras, the University of Glasgow, the Government Offices at Whitehall, and the splendid Albert Memorial, make up a total that is truly magnificent. It is of course in one sense useless to pretend to think that all this could have been done by his own pencil; the faculty of utilizing others, and of bending them to his kindly rule, seems to have been his to the utmost degree. Men of no mean powers of their own were attracted permanently to his service — his instinct became their instinct, and his hand their hand.

In literature Sir Gilbert Scott may be said to have certainly not failed to make his mark. Here, as in business, his subject was Gothic architecture. His books and occasional papers, although necessarily not numerous, were characterized by the same sound sense and moderation as his artistic designs; and his lectures as Professor of Architecture in the Royal Academy were at the time pronounced to be in themselves astonishing, for the care manifested in their composition and the profuse liberality of their graphic illustration. It need scarcely be added that his personal address as a speaker was only devoid of brilliancy because devoid of effort and, like all his life, of affectation and assumption.

How wilfully the world turns round upon the best of us was peculiarly manifested in the circumstances which recently brought about, and by no means unfairly, the public attack upon Sir Gilbert Scott for his share in the defacement, as it was unreservedly alleged, of our ancient ecclesiastical monuments by their restoration. In a word, the time had simply come when the critical eye was to be opened to perceive the fact that the love of even such a man as this, absorbing as it was, for the relics of the past, was not carried logically far enough. The particulars of the highly interesting controversy which so much occupied for some little time the attention of architectural, archæological, and ecclesiastical society are fresh in every one's recollection; and we may no doubt take it for granted that considerable impression was made upon the public mind, and that for the future the treatment of authentic mediæval remains will be placed upon a different footing. The position assumed by Sir Gilbert Scott personally was, however, by no means unsatisfactory. Assuming, as we must probably do, that a very material amount of academical rather than filial restoration had been directed by him, and by his more immediate followers and friends, it is still certain that he was able to point to his own writings of long ago with no little triumph for confirmation of his plea that it was the exigencies of public utility, and not his own want of appreciation or sympathy, which consented to the surrender of the sacred identity. — *The Architect.*

THE HOOGLY FLOATING BRIDGE.

At the meeting, on Tuesday, of the Institution of Civil Engineers, Mr. Bateman, President, in the chair, the paper read was on "The Hooghly Floating Bridge," by Mr. Bradford Leslie, M. Inst. C. E. This bridge connected Calcutta on the left with Howrah on the right bank of the Hooghly, at a short distance north of the East Indian Railway Terminus. Various projects had been from time to time proposed; but ultimately the preference was given to a floating bridge, as it could be more cheaply and expeditiously constructed than a fixed bridge. The design was prepared in 1868, when it was intended to be carried out by a joint-stock company; but, after much delay, in 1872 it was undertaken through the agency of the local government of Bengal. The work was commenced in January, 1873, and the bridge was opened for traffic in October, 1874.

The present structure was the first, and up to this date the only one, of its kind affording headway for river navigation. It divided the port into two sections; the lower part was occupied by sea-going ships and steamers, and the upper part by inland craft and a few coasting vessels. As, however, the graving docks were above bridge, it was necessary that an opening should be provided for the passage of shipping. The extreme rise and fall of the tide during floods was 20 feet, and at certain seasons there was a tidal wave six feet in height. The maximum velocity of the stream was six miles an hour. The depth of the river at the site of the bridge was variable, the greatest depth at low water being six fathoms.

The bridge was 1,530 feet long between the abutments, and the roadway was 48 feet wide, with footpaths each seven feet in width on both sides, so that the total width of the platform was 62 feet. There were four main longitudinal wrought-iron girders, at intervals of 16 feet in the width of the roadway, raised by timber trusses, resting upon pontoons, to a convenient height above the water for accommodating the boat navigation. The platform of the bridge was level for a distance of 384 feet on each side of the centre, at a height of 27 feet above the water. Thence it fell by inclines of 1 in 40 to a distance of 584 feet on each side of the centre line, where there was a length of 20 feet of level platform 22 feet above the water. Between these points and the abutments were the adjusting ways, the shore ends of which were 32 feet above low water. The approach on the adjusting ways was by a descent of 1 in 16 at extreme low water, and by a corresponding ascent at extreme high water; but at ordinary times it was either level, or only slightly inclined. The platforms of the adjusting ways were supported on the lower flanges of three bow-string girders, the roadway being divided into two by the centre girder. The footpaths were carried on cantilevers riveted to the outer girders. The bow-string girders weighed 66 tons each. They were 160 feet long between the end pins on which they were hinged, and had the usual trough-shaped upper and lower members. The shore ends of the bow-string girders were suspended on links, which was preferable to carrying them on rollers, even for fixed bridges, as

being less liable to get out of adjustment, and tending always to restore the girder to its normal position at its mean temperature. The outer floating ends were hinged to pivot bearings, in order to admit of a slight drift up and down stream.

The floating portion of the bridge was carried on 28 pontoons, coupled together in pairs to secure stability. With the exception of the two pairs in the centre, which supported the movable sections of the bridge, each pair carried 100 feet in length of the platform. Each pair was coupled together, at a maximum distance of 48 feet from centre to centre, by four timber sills, bolted to the decks of the pontoons at intervals of 16 feet. These sills constituted the bottom members of the four main longitudinal trusses, the top members being the wrought-iron girders carrying the roadway. With the exception of the upper girders, the whole of these trusses were of teak. The coupled pontoons were further connected by strong horizontal diagonal bracing of bar iron. The timber sills and the bracing being only four feet above the water, the space between the coupled pontoons was not available for navigation, and floating fenders or booms were provided to divert boats from these openings. Ordinarily the main girders overhung the pontoons 21 feet, their ends being supported by the inclined struts of the trusses, leaving a width for navigation of 42 feet, partially obstructed by the raking struts. For the convenience of the country craft, there were two rectangular openings of 60 feet clear span between the fourth and the fifth pairs of pontoons, reckoning from each abutment. The roadway over these openings was carried on eight girders, each 2½ feet deep, and weighing eight tons. They rested on saddles secured to the top of the cross-bearing girders, which were suspended to the ends of the ordinary main truss-girders. All the pontoons were 160 feet long, by 10 feet beam, with holds varying from 8 feet to 11 feet in depth, according to the dead weight to be carried. Each pontoon, excepting those of the movable sections, was accurately anchored by permanent moorings, laid exactly in line with the centre of the pontoon, the distance between the up and the down stream anchors being 300 feet. The strain on the chain cables varied from 5 tons to 25 tons; their great length afforded the necessary "spring" to allow for the rise and fall of the tide, but a few links were taken in during the dry season, and slacked out again during the flood season.

The 200 feet opening for the passage of ships was one of the most difficult problems in designing the bridge. Owing to the strength and irregular set of the stream and eddies, ships could only be moved at or near slack tide; and it was a rule that all vessels of more than 200 tons must be moved by steam against the tide. The bridge was generally opened twice a week at high water, but occasionally at low water. The opening was effected by removing the two centre sections of the bridge bodily. These sections were connected with the fixed portions of the bridge by draw-bridges, which on being run back left a clearance of 20 feet on each side of the platform of the movable sections. By means of steel warps, laid to buoys moored for the purpose, these sections were warped up stream far enough to clear the rest of the bridge. They were then disconnected and sheared over, one on each side, leaving a fair way clear of all obstructions. The bridge was closed by reversing these proceedings. The ordinary time taken in opening the bridge was fifteen minutes, and in closing it twenty minutes.

There was a daily traffic of about 6,000 tons of heavy goods, which were conveyed in bullock carts, besides foot and carriage passengers. The ironwork of the pontoons weighed 1,650 tons, that of the girders 875 tons. The whole of this, as well as the mooring chains, were sent from England, and were erected and riveted up in Calcutta. The teak timber, which weighed 1,500 tons, was procured from Rangoon. — *The Building News.*

NOTES AND CLIPPINGS.

Mechanic's Lien. — The following report of a case that came to trial in Philadelphia, April 15, may serve as confirmation of the report that a correspondent gives in another column of the way building is carried on in that city; the suit — that of Nixon & Brother against Lemuel Coffin — involves a point of importance as to what constitutes one an "owner or reputed owner," to make him liable under the mechanic's lien law, for work and labor furnished a building. It appeared that Nixon & Brother furnished ranges and heating apparatus for houses on Spruce Street, west of Twenty-first, and brought this suit for payment for it. They aver that Coffin formerly owned the lot, and conveyed it to S. K. Bye, a builder, who put up the buildings with Coffin's money. The builder gave Coffin a mortgage on the buildings for $16,000, and thus, although Bye had the title, yet Coffin, it was asserted, was substantially and in fact the owner, and as such liable for the debts; further, that Coffin had it in his power, by suing Bye, who was insolvent, for the interest on the mortgages, to foreclose them, and thus cut out the liens. These circumstances, it was claimed, made Coffin the owner under the law. The defence offered against the suit was, that the circumstances were such as took place in every building operation in this county, and that Mr. Coffin had neither in fact nor in law any title. He was a mortgagee simply. It was also shown that Nixon & Brother had full knowledge of the whole transaction. The case was not concluded.

Memorial Hall, Philadelphia. — The roof of Memorial Hall in Fairmount Park has been leaking badly for six months, and the decorations in the interior and the ceilings are in danger of destruction. The building cost $1,500,000, of which amount $500,000 was appropriated by Philadelphia.

A New Statue of Shakespeare. — On the 23d inst. the bronze statue of Shakespeare, which Mr. Henry Shaw has given to the city of St. Louis, was unveiled at Forest Park. The statue, which is ten feet and a half in height, and stands upon a pedestal six or more feet high, is said to be finely executed. It was cast by Ferdinand Möller, of Munich, Bavaria. Mr. Shaw has given also a statue of Humboldt, as a companion to the Shakespeare, which is expected to arrive shortly from Munich.

Ordnance as Adjuncts of Monuments. — The Chief of Ordnance says that since 1865 there have been delivered under the acts of Congress, for monumental and other purposes, 437 bronze or brass guns and 216 iron guns. There are yet to be delivered under acts definitely fixing the number, 232 projectiles, six brass or bronze guns, sixteen iron guns, and forty-two guns the material of which (iron or brass) has not been designated, making a total of sixty-four guns and 232 projectiles yet to be delivered. The acts in relation to the Rawlins monument and the Gettysburg battlefield monument, and the joint resolution in relation to the Lincoln monument, are indefinite as to the number of guns to be delivered. Twelve light twelve-pounder guns have already been delivered on account of the Lincoln monument, and twenty-seven guns have been sent to Gettysburg, but none have been called for on account of the Rawlins monument. There are still available for delivery, under past and future acts of Congress, about 350 bronze guns and 150 iron guns, principally six and twelve pounders. The value of condemned iron field-guns and projectiles is from 1 to 1½ cents per pound. The value of condemned bronze guns is from 20 to 25 cents per pound. The weight of the field-guns, iron or bronze, is from 900 to 1,300 pounds each, and of the projectiles, from 6 to 42 pounds each. The iron and bronze guns are not used in the manufacture of new guns, but the projectiles are utilized in testing experimental guns.

Emigrating Workmen. — The United States consul at Buenos Ayres warns American workmen against coming to that city in search of work.

The Blackwell's Island Bridge. — There is no likelihood that work will begin on this bridge at present, and there is even a strong probability that it will not be built at all, as the scheme has not attracted speculators who are willing to invest their capital in such an enterprise.

The Strike at the Topeka Asylum. — An Associated Press report led us in a late issue to say that a strike had taken place at the Insane Asylum at Topeka, Kan. This report has been contradicted by a later despatch.

The Official Catalogue of the Paris Exhibition. — The catalogue of the Exhibition will be divided as follows: Volume i. will contain the works of art in the French section; ii. and iii. will comprise Algeria and the Colonies; iv., the foreign section; v., agricultural implements, living animals, and horticulture; vi., retrospective art; vii., the anthropology of M. Quatrefages; and viii., the alphabetical tables, and the list of objects exhibited.

Obituary. — M. Auguste Rougevin died a short time ago at Paris, at the age of eighty-five. He is perhaps best known as the founder of the Prix Rougevin, an annual prize for competitions in interior decoration, which is open to the students at the Ecole des Beaux-Arts.

Memories of the Franco-German War. — The *Journal des Débats* states that in view of the decision of the German Emperor to exclude from the German Fine Art Section of the Exhibition any picture recalling the war of 1870, the French Government has resolved to exclude also French pictures commemorating that war.

A Colossal Statue. — M. Clésinger has received a commission to execute a colossal statue of the Republic, which is to stand at the foot of the Trocadéro opposite the Pont de Jena. It is to be cast in bronze.

Wall-Painting in Switzerland. — A short time ago at Neunkirch, in the canton of Schaffhausen, the tearing down of a building next the little mountain church disclosed a painting on the outside of the church wall. It represented a mountain landscape with figures, very indistinct, in the foreground, and a city in the background supposed to be Jerusalem. In the church three other paintings have been found on the walls of the choir. From internal evidence afforded by the pictures in the costumes of the figures and the style of work, it is supposed that they date from the beginning of the sixteenth century, just before the Reformation began. The style of drawing is coarse and is as crude as the conception of the subjects or the colors used in portraying them. As in other mural decorations of the period the outlines are marked by thick pencil-marks, black being used for landscape and accessories, and red for flesh. It is assumed that they were made by one or more of the painters, on day wages, who at that time were roaming through the country in large numbers.

Archæological Discovery at Naples. — The necropolis of the ancient city of Suessula has just been brought to light by excavators. Already more than two hundred articles, mostly pottery, have been taken from the five tombs that have been opened, which belong seemingly to the archaic period of Greek art. The modern village built on the ruins of the ancient city is Cancello.

The Sand-Blast. — Mr. W. H. Paine states that at the caisson for the foundation of the Brooklyn Bridge, sand was blown out through a pipe 3½ in. diameter (a short piece at the lower end was only 2½ in. diameter). At the upper end an elbow was necessary to direct properly the stream of sand. The iron in these elbows was ¾ in. thick. Under a pressure of 34½ pounds, the greatest pressure, the stream of sand cut through every kind of iron tried except Franklinite, in one half hour. Franklinite stood longer.

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THE Chicago papers have been filled of late with stories of investigations into the cost of stone-cutting on the Custom House there. The contractor is Mr. John M. Mueller, of Cincinnati, under one of the percentage contracts which have come down from an older administration of the supervising architect's office, and of which the office has been trying of late to rid itself. By it Mr. Mueller agrees to furnish dimension stone from his quarries — the Buena Vista quarries — for a fixed sum, from $1.30 to $1.47½ per cubic foot, according to size, we presume. He is allowed for sawing 35 cents per superficial foot, but for the cutting is paid the actual cost, plus fifteen per cent commission to cover the use of sheds, tools, and other plant, the cost of supervision, and profit. This would not be an unreasonable arrangement if the work were done economically by the contractor; and it tends in favor of good workmanship. But, unfortunately, it makes it the interest of the contractor to do the work as expensively as possible, by letting his men spend as much time as they can on it, while it provides no way for the Government to control or check him except by seeing that the days' work charged on the pay-rolls is actually spent over the work. The Government provides a timekeeper, who sees that the men are actually on hand and at work as the contractor claims, but they are hired and the foreman provided by the contractor himself. This puts a premium on "soldiering," and unites everybody by a common interest in making the work hold out as long as possible, leaving the Government without remedy except by proof of absolute fraud, a thing which in the nature of the case it is difficult to establish. In fact, fraud is unnecessary when simple negligence and slackness can be made just as profitable.

IF the reports furnished the Chicago papers are to be trusted, Mr. Mueller has used his opportunities with assiduity. For instance, we are told that there are sixteen chimneys on the building, the stone toppings-out of which are twenty-two feet high. There are four large ones with shafts about eight and one half by four and one half feet; the rest are about five and a half by four and a half. These sixteen chimneys, containing 450 cubic feet and 320 cubic feet each of cut stone, cost the Government sixty thousand dollars. They are capped with courses 21 inches high, carved rather plainly with a leaf moulding. Each cap is a single stone, the flues being cut through it. Upon these caps were charged, for the large ones from 72 to 74 days for stone-cutters' work, and from 264 to 268 days of carvers' work, the cutters being charged at three dollars, and the carvers at $3.75 per day. On the smaller caps were charged from 52 to 54 days of stone-cutting, and from 180 to 184 of carving. This with the cost of the stone and the contractor's commission brought the cost up to from $1,640 to $1,798 for the larger caps, and from $1,232 to $1,298 for the smaller. The corona of the main cornice, which is a not elaborately moulded course of sixteen inches high, is found to have cost twenty-five dollars per running foot, and the urns put upon the pedestals of the balustrade are set down at $325 each. The government superintendent, Mr. Burling, complained that it was impossible to get a fair day's work out of the men employed under such a system, which we should think very likely to be true; though when asked if he had reported the matter at Washington, he said that he had not, assuming that the accounts would sufficiently explain it. He had at one time himself set a gang of stone-cutters at work recutting some stone to suit the changes that were made in the design of the building, but said that the contractor had interposed with a claim that the work belonged to him under his contract, a claim to which the authorities at Washington acceded. It is further reported that the carvers on Mueller's pay-roll, when there was not stone enough on hand to keep them busy, and while their work was actually charged to the Government, were occupied in carving sleeve-buttons and small knick-knacks which were given to various superintendents, foremen, and timekeepers. These things are reported on the authority of the collector's office, where the accounts are under examination. It remains to see how far they will be substantiated, and what remedy it will be found practicable to apply.

THE attack of the disappointed architects upon the Commissioners for the Indiana capitol seems to be subsiding, as it appears that there is no likelihood of their finding redress in the courts. The suit brought by Mr. York in the name of the architects has apparently fallen to pieces, and within a few days the court has decided against the injunction claimed by Mr. Tibbetts in his capacity of a defrauded tax-payer. The judge ruled that since the cost of the State House was fixed by law at a definite limit, Mr. Tibbetts would be equally taxed whichever plan was adopted, and so could not be injured by the choice of any plan, which declares in effect that a tax-payer can be injured, in the view of the court, only by the amount that is collected of him, and not by the way in which it is spent. If, as alleged, the Commissioners did not examine all the plans, which it certainly was their duty to do, a person who was not a competitor could have no showing in court as a tax-payer. As to the examination of the plans and the treatment of the experts, the report of the Commissioners, which we have received, shows the view they took of their duties or powers. They requested the experts to report concerning the plans — whether they would come within the cost required; whether the foundations, material, and construction were what they ought to be; whether there was proper provision for light, heating, water, gas, and drainage; and finally their opinion was requested in a general way "as to architectural symmetry, beauty, and harmony of parts." As a preliminary, the plans were examined separately by Commissioners and experts, and roughly divided without dissent, it is said, into two classes, seven in the first and seventeen in the second, and two of them being taken as examples, the engineer and builder among the experts were set to make a minute verification of the estimates in them. The average cost per cubic foot of these two was taken as a measure for making approximate estimates of the rest. Then all the experts were directed to examine the designs, and make a written report on the characteristics of each. What the Commissioners meant by this is to be inferred from their saying that "to avoid all uncertainty as to what data determined their opinion in each case, it was thought to be more satisfactory that they should state the facts shown by the plans and specifications, thus permitting the Commissioners to form their own conclusions from the facts presented." This we take to be a polite way of saying that the Commissioners desired the experts merely to explain the plans to them, but wanted none of their opinions, preferring their own. It does not appear then that it was of any advantage to them to have an architect among their advisers. Without attempting to decide what was the real intent of the legislature, and setting aside the question of collusion, of which we know nothing, we do not see any indication that the Commissioners exceeded their powers. If they made a bad choice of plan, as it was very likely they would, this was one of the risks which belong to such a way of selecting. Their method of examination, if it was applied with skill, seems to have been sufficient for getting such an approximate estimate as the limits of the appropriation required, and as close as it was reasonable to expect. If it kept the experts busy for two months to estimate on two of the plans, it may be assumed that the twenty-four would, at the same rate, have occupied them for two years, which would have been intolerable. The

Commission will settle its own account with the legislature. The obvious criticisms on the whole business are, that it was a delegation of irresponsible authority to a board which might or might not be fit for its work; that the work was made unnecessarily laborious for both Commissioners and competitors, and unnecessarily vexatious for the architects; and that the Commissioners apparently cut themselves off from the benefit they might have got from their expert advisers. As for the architects, if they did not go into the competition with their eyes open, it was their own fault.

The New York *Tribune* contained a few days ago a long and rather startling letter from Mr. Augustus Maverick, in which he traces the history of the Socialist movement, as represented by the International Society, through the last fifty years, from its rise in London and its banishment from most European states, and the transfer of its headquarters to New York, down to the present day, and declares its close affiliation throughout with the trades-unions, as well as its deliberate purpose to make them an instrument for accomplishing in this country what it has failed thus far to accomplish in Europe, except momentarily, — the subversion of established government and the substitution of a Commune. The condition of things at Chicago as we write gives point to such a letter. We have not the means of verifying Mr. Maverick's conclusions, and it may be that the doings of the Socialists impress him with an exaggerated sense of their importance. Nevertheless we believe that his prominent idea, that the Socialist leaders are struggling hard and successfully to identify the workingmen of the country with themselves, is true, and that the movement is much more important than is commonly realized. The effort of the Socialists to turn all the labor-movements to their own uses, and to make cat's-paws of the trades-unions everywhere, is too marked to be overlooked, if one pays any heed to it. The connection is not so visible, nor the Communist element so active, in the Eastern cities, where society is better poised; but in the Middle States and at the West, as far as San Francisco, they are, we believe, a source of serious danger. The astonishing suddenness with which the railroad riots of last summer, beginning in the strike of a trades-union of so great pretension to respectability as the Brotherhood of Locomotive Engineers, spread into a great communistic uprising, which only a military force could quell, is proof enough of the wide grasp of the Socialist influence, its confidence, and its efficiency. The wild talk and threatenings of Kearney and the demagogues that headed the workingmen's meetings at San Francisco a while ago, and the alarm with which they filled the city, are a confirmation of it, as is the present condition of things at Chicago. And in the soberest concerted movements of the workingmen, wherever they set forth their purposes in platforms or manifestoes, at their congress at Newark in December last, or in the meeting of the unemployed at Boston in January, the hand of the Socialists is unmistakably to be seen. The fact that their hope of securing any actual control in the community in its present condition is idle, by no means proves that their efforts are innocent. That a great city should be given over to violence for a single day is not a light misfortune. It means the loss of a good many lives and the destruction of a vast amount of property; and so much may happen on any day. But the real danger is to our minds a more permanent and serious one than this. It is the gradual demoralization of the working classes, their growing discontent with work, and unwillingness to identify themselves with the communities in which they live. This is a condition which it is the essential occupation of Socialism to aggravate, and which, whether or not it leads to political or social convulsions, tends directly to the disorder and degradation of all industries.

In Chicago the movement has become so threatening as to excite serious alarm. It is not easy to judge how much of what we hear is truth and how much exaggeration, but it is undoubted that the Socialists have a compact organization which is pretty extensive, which puts its men under arms and drills them into military order. The police report no less than nine halls in the city where the men are regularly drilled. They are said to be supplied with Springfield rifles, and to number two or three thousand. The continued depression of business in Chicago has made many idlers who, joined with the ruffianly population always to be found, may be depended on to lend a hand to any violence that is set going. It is said that the Communists can poll eight thousand votes in the city. The leaders disclaim at present any intention of violence, but so much arming and drilling is not undertaken for nothing, and while the citizens are trying by private subscription to arm their police force, cut down in its equipment by the hard-times policy of the city government, there is a whisper of an intended outbreak in June. Here, too, there is the significant alliance with the workingmen; and we are told that preparation is making for a general strike among the trades-unions, of which a strong fraction is the various trades in the seventy or more furniture manufactories. The audacity with which the thing is done is certainly a singular phenomenon. Whether it breeds open disorder or not, it is an ill omen for the workingmen of Chicago.

The English building papers give accounts of the funeral of Sir Gilbert Scott, which was celebrated in state in Westminster Abbey on April 10th. It was attended by deputations from the Royal Academy, the Royal Institute of British Architects, the Architectural Association, the Archæological Institute, and other societies, with a large number of notables. On Sunday afternoon following Dean Stanley preached a funeral sermon in the Abbey. This building had been long under Scott's care, who had restored it in part, and left designs for further work on it, of which the most important parts are a restoration of the northern porch, and a new cloister. He had published a book on its archæology ("Gleanings from Westminster Abbey"). The Dean anticipated the request of the Institute by intimating to Scott's family a desire that he should be buried in the Abbey. He was laid in the nave, by the side of Sir Charles Barry, and in front of the pulpit which he himself designed.

A gentleman writes to us saying that his son, seventeen years old, has served three years in an architect's office, and is a fair draughtsman, and asks us to advise him through the *Architect* whether he had now better send him to an architectural school, or to some large office; and whether he cannot take a school-course in connection with work in an office. We think it decidedly best in such cases that a pupil should attend a professional school. There are many things essential to an architect's practice which must be and are learned by study in offices; but there are others which he can learn to much better advantage in a well appointed school. The architect's highest need and his greatest difficulty is to learn to design, and this he can study to the best advantage in a school, for the simple reason that it is there made his chief business, and nothing else is allowed to interfere with it, while in an office the opportunities for it are few until he has learned it, and everything interferes with it. He also needs a good knowledge of geometrical processes and forms, a need which is much more important than most persons are aware of; and up to a certain point a knowledge of the theory of construction, a thing which grows more important for him every day. There is practically no opportunity for him to learn these last things in an office. No architect has time to teach them, if he has any work to do, and the routine of work does not lead to them. As a matter of fact the men who study only in offices almost never learn these things well, and are so far inferior to those who do learn them. In designing and drawing, on the other hand, progress is in an office necessarily slow, for it is impeded by a multitude of practical duties which are endlessly repeated and are best learned separately. The same reasons which make it an advantage to study in a school make it important to give one's whole time to it while doing so, and we should advise no one to attempt to carry on the two kinds of study simultaneously. Finally, a thing not to be neglected is the companionship of many other students engaged in the same pursuit, which, in a well managed school where students are old enough and interested enough to have some independent activity of mind, is a most invaluable stimulus. The best school-training in architecture that can be had is probably that of the School of Fine Arts at Paris, to which many Americans go, but to which many cannot. There are unfortunately no English architectural schools. In the United States there are three in running order, — that at the Massachusetts Institute of Technology at Boston, which is the oldest, one at Cornell University, and one in the Illinois Industrial University, that at the University of Michigan having been, we are sorry to say, discontinued. We have spoken before on this subject, and at greater length, in a series of articles addressed to architectural students more directly, in our numbers of September 30 and October 7, 1876.

A CORRESPONDENT, whose communication we should publish if it were not anonymous, writes to ask for information concerning the proper fees for an architect's work in making alterations or additions to buildings which, as he says, demand considerably more labor from the architect than new buildings of the same cost, and to inquire whether there are any rules to meet the case. The fact that the labor and difficulty of planning and carrying out alterations is exceptional, and so much greater in proportion to their cost than is the case with new buildings as to make the ordinary rate of payment inadequate for it, is recognized by the profession generally, and allowed for in its usages. No precise rules have been fixed for it, but it is provided for in a rough way by the custom which prevails of charging a higher fee than the ordinary five per cent, as is done also in the other exceptional cases of furniture, and monumental or purely decorative work. Just how great this fee ought to be is not easy to decide by a general rule, and it is one of the things which it is left for the architect to determine for himself in each case. It is customary to make a separate charge for measuring old work, and for making the necessary plans of it. The indefiniteness of the rule in these cases is a thing to be regretted, but not easy to remedy. The fact that it is an exceptional one makes it naturally desirable that the client should be warned of it in the beginning.

HEAT AND VENTILATION.[1] I.

IT may have appeared rather fanciful, and arising more from esthetical than practical considerations, when Mr. George A. Shove, a couple of years ago, proposed, in substance, the erection of glass (or at least mainly glass) dwellings for all those of our race who live on "the shady side of the fortieth parallel of latitude," — though I am not quite certain whether the same principle of constructing glass dwellings might not be applied to the people who live on "the sunny side" of that parallel with the same results, if proper cognizance be taken of the various colors of light. In other words, since glass transmits light, — and Mr. Shove's ingenious conception is based altogether on that power of transmission, — it might very probably be possible to erect a certain class of glass dwellings for the more northern climate of the earth, which would transmit, in gradation proportionate to particularly temperate locations on the globe, the heat rays of light; and another class of glass dwellings for the southern climates, which would rather exclude in the same proportion those heat rays. At any rate, the main idea of Mr. Shove's proposition is one which all architects must recognize as valid, namely, that in order to secure a healthy and comfortable existence for the human race it is necessary to construct, or at least make possible "the construction of, an artificial climate" in every part of the globe.

For controlling the immediate effect of the temperature of the air upon our bodies, and for effecting a proper relation between the out-door temperature and ourselves, we must rely, of course, upon the tailor, who chooses the quality of the garments we wear and their special construction; but for our in-door life it is incumbent upon the architect, considered from a purely practical point of view, apart from his special character as an artist. It is on him that we must rely for the quality of the material wherewith we erect our houses no less than for their proper construction. The Esquimaux very properly dresses in furs and lives in snow houses; in our climate we live in houses of brick or wood, and dress differently with every change of temperature; and for the equatorial regions there is as yet no proper style of clothing, — absence of clothing being purely negative, — and no adequate style of buildings has as yet been invented for those regions, so far as I know. As for the fanning by slaves which is practised in the tropics of the West India Islands, or the fanning by machines in East India, it is, after all, a very unsatisfactory contrivance to produce an artificial ventilation, and has, moreover, no relation to the science of architecture. And yet I am very sure that in course of time the inhabitants of the tropic regions will also be able to obtain an artificial climate as well as we of the temperate zone, or as the inhabitants of the arctic zone.

We architects, however, of the temperate zone have, as I have before suggested, a most difficult problem of our own to solve, in that we have to determine the best construction for a special locality. We must therefore know the temperature of the climate, the geology of the place upon which the building is to be erected, the composition of the materials near at hand for the construction of the building, the changes of weather likely to take place; and all this not as architects proper, not as creators of works of purely artistic beauty, but in that character of architects which unites our profession so closely to that of public health. To a large extent, every architect should look upon himself as a physician. This, from obvious reasons, applies especially to cities, where architects are most in requisition, and where many cooperating causes demand from them not only the creation of an artificial climate, but along with it the furnishing of a perpetual current of pure air tempered to that climate. He must see to it that the house which he builds he so arranged that not only the temperature of the air in it can always be regulated, — at least to such a degree as advancing science enables us to do, — but also that the air be always fresh and pure. In its sanitary character architecture must, therefore, look to the combination of heat with pure air or ventilation; and the problem is: By what means can we best obtain in our variable climate a constant supply of pure air heated or cooled to the necessary temperature? We architects are responsible for the solution of this problem, and this responsibility increases in proportion as men in these days have to live more of their day in dwellings, — a mode of living which must always increase with the increase of manufactures, commerce, and other industries.

Let me illustrate the vastness of this responsibility of architects as sanitarians in the construction of every kind of building, whether made for human beings or for beasts, and whether it be a private dwelling or a public building, a court-room, a hospital, an insane asylum, a church, a jail, or a prison: by an old but unhappily o'ertrue tale, — The Black Hole of Calcutta.

The most noted instance of the deadly character of impure air, resulting from a deficiency of ventilation, is known in history as the Black Hole of Calcutta, but the mere horridness of that example has obscured the lesson it might and should have taught. It occurred in the year 1756, during the rebellion of the East Indians against British rule, which was finally suppressed by the great Clive, and it may not be improper to recount the terrible tale before you on this occasion and in connection with the subject on which I am speaking.

Calcutta had been compelled to surrender to the native rebel troops, on the 19th of June, 1756, and its small garrison of five hundred and fourteen men, of whom only one hundred and seventy-four were Europeans, had been taken prisoners. One hundred and forty-six of these prisoners had been driven into one of the dungeons of the garrison, known as the Black Hole, a room of only twenty feet square or one thousand six hundred cubic feet, and with only two small windows, and these obstructed by the veranda. It was the hottest time of the year, and the night was uncommonly sultry even for that season. The excessive pressure of their bodies against one another, and the intolerable heat which prevailed as soon as the door was shut, convinced the prisoners that it was impossible to live through the night in this horrible confinement, and violent attempts were immediately made to force the door, but without effect, for it opened inwardly: upon which many became violent. Mr. Holwell, who placed himself at one of the windows, exhorted them to remain composed in both body and mind, as the only means of surviving the night; and his remonstrance produced a short interval of quiet, during which he applied to an old Jemautdar, who bore some marks of humanity about him, promising him one thousand rupees in the morning if he would separate the prisoners in two chambers. The old man went to try, but returning in a few minutes said it was impossible, when Mr. Holwell offered him a larger sum, on which he retired once more, and returned with the fatal sentence that no relief could be expected, because "*the Nabob was asleep, and no one dared to wake him.*" In the mean time every minute had increased their sufferings. The first effect of their confinement was a continued sweat, which soon produced intolerable thirst, succeeded by excruciating pains in the chest, with a difficulty in breathing little short of suffocation. Various means were tried to obtain more room and air. Every one stripped off his clothes, every hat was put in motion; and, these methods affording no relief, it was proposed that they all should sit down at the same time, and, after remaining a little while in this posture, rise all together. This fatal expedient was thrice repeated before they had been confined an hour, and every time several, unable to raise themselves up again, fell and were trampled to death by their companions. Attempts were again made to force the door, which failing as before redoubled their rage; but the thirst increasing, nothing but "Water! Water!" became soon after the general cry. The good Jemautdar immediately ordered some skins of water to be brought to the windows; but instead of relief his benevolence became a more dreadful cause of destruction, for the sight of the water threw every one into such excessive agitations and ravings that, unable to be regularly served, each man battled with the utmost ferocity against those who were likely to get before him; and in these conflicts many were either pressed to death by the efforts of others, or suffocated by their own. This scene, instead of exciting compassion in the guard without, only awakened their mirth, and they held up lights to the bars in order to have the diabolical satisfaction of seeing the deplorable contention of the sufferers within, who, finding it impossible to get any water whilst it was thus furiously disputed, at length suffered those who were nearest the windows to convey it in their hats to those behind them. It proved no relief to their thirst or other sufferings, for the fever increased every moment with the increasing depravity of the air of the dungeon, which had been so often respired and was saturated with the hot and deleterious effluvia of putrefying bodies, of which the stench was little less than mortal. Before midnight, all who were alive and had not inhaled air at the windows were either in lethargic stupefaction or raving with delirium. Every kind of invective and abuse was uttered, in hope of provoking the guard to put an end to their miseries by firing into the dungeon; and whilst some were blaspheming their Creator with frantic execrations of torment and despair, Heaven was implored by others with wild and incoherent prayers, until the weaker, exhausted by these agitations,

[1] A paper read at the Eleventh Annual Convention of the American Institute of Architects, by Carl Pfeiffer, F. A. I. A.

at length lay down quietly and expired on the bodies of their dead and dying friends. Those who still survived in the inward part of the dungeon, finding that the water had afforded them no relief, made a last effort to obtain air by endeavoring to scramble over the heads of those who stood between them and the windows, where the utmost strength of every one was employed for two hours, either in maintaining his own ground, or in endeavoring to get that of which others were in possession. All regards for compassion and affection were lost, and no one would recede or give way for the relief of another. Faintness sometimes gave short pauses of quiet, but the first motion of any one renewed the struggle through all, under which ever and anon some one sunk to rise no more. At two o'clock not more than fifty remained alive; but even this number was too many to partake of the saving air, the contest for which and life continued until the morn, long implored, began to break, and with the hope of relief gave the survivors a view of the dead. The survivors then at the window, seeing that their entreaties could not prevail on the guard to open the door, it occurred to Mr. Cook, the secretary to the council, that Mr. Holwell, if alive, might have more influence to obtain their relief; and two of the company undertaking the search discovered him having still some signs of life, but when they brought him near the window every one refused to quit his place, excepting Captain Wilks, who, with rare generosity, offered to resign his, on which the rest likewise agreed to make room. *He* had scarcely begun to recover his senses before an officer, sent by the Nabob, came and inquired if the English chief survived, and soon after the same man returned with an order to open the prison. The dead were so thronged, and the survivors had so little strength remaining, that they were employed nearly half an hour in removing the bodies which lay against the door before they could clear a passage to get out one by one, when, of one hundred and forty-six who went in, no more than twenty-three came out alive, — the ghastliest forms that ever were seen on the earth. The Nabob's troops beheld them and the havoc of death from which they had escaped with perfect indifference, but did not prevent them from removing to a distance, and were immediately obliged, by the intolerable stench, to clear the dungeon, whilst others dug a ditch on the outside of the fort, into which all the dead bodies were promiscuously thrown.

This horrible tale, gentlemen, told by Mr. Holwell himself, and which at the time of the occurrence of the terrible tragedy and ever since, whenever it has been repeated, has made the human heart shudder at the notion of the ferocity and cruelty whereof the human heart is capable, — is it not, in point of fact, merely a counterpart to the (though it be unconscious) cruelty of the men and women of our time, who shut each other up, in most city dwellings at least, in rooms that are Calcutta Holes, and who, which is saying still more, shut one with special wilfulness from every new-born child the pure air of God? Almost every nursery in the land is a miniature Black Hole of Calcutta, as the tables of infant mortality but too commonly show. We take away from these little infants light and air, — that is to say, heat and ventilation. Light is heat and combined with air creates ventilation; and yet we wonder why infants should die at such a fearful rate, — about five to one, I believe, as compared with adults. We carefully curtain thickly every window of the room wherein the infant passes its first weeks, which is almost as cruel as was the action of the British government in imposing a window tax, whereby the poor and penurious were induced to close up as many windows as possible in their houses, thus killing themselves in order to escape a ridiculous tax. We place our prisoners in cells from which air is as carefully excluded as light, allowing each prisoner, as an average throughout the United States, I believe, from three hundred to four hundred cubic feet of air in his cell, with almost no ventilation and with no light, but gracefully pay the hospital bills which are the results of this treatment. If a prisoner, moreover, proves refractory, or makes himself objectionable in some way or other to his superior, we do still worse; we shut him up with seven or eight others in a cell of the same dimensions, namely, one containing from three hundred to four hundred cubic feet, — a cell carefully guarded against the admission of light or air by thick iron doors, — and keep them there standing, since they cannot possibly lie down, for twenty-four hours and sometimes forty-eight hours, often, I believe, for even a longer time. This cruel, pernicious, and at the same time — while we consider it economically — expensive system of keeping out heat and ventilation from rooms bears not only upon the criminal or unfortunate classes of our society, but bears equally upon the condition of our poor. Whole families of our poor often have to stay in one room, eating, sleeping, cooking, in the same place many times for a whole winter, without receiving any ventilation through the windows. And the door of the room must not on any account be opened, since people suppose that with the passing out of the foul air of the room the warmth will also pass out. The fallaciousness of this proposition I have already shown in a former paper. It is the *fresh cold air* from the outside which has the *elements of heat* in it, whilst the *foul air of the inside* turns into a *deadly coldness* after a short time. It is true that the inmates of these rooms are not always found suffocated next morning, but the whole process is like unto one of gradual strangulation; and if it does not result in immediate death, it results at least in the probably far more hideous phenomenon of perpetual weakness and physical unfitness for life. It may be very poetical when our great German poet Schiller sings, —

"Room is in the smallest cottage
For a happy, loving pair."

but, gentlemen, it is not the fact. There is not room enough in a cottage of say from five hundred to even one thousand cubic feet for two grown persons; much less, I should say, for "a happy, loving pair." Hence it was a great progress, in regard to this special matter, for the people of Germany when the Prussian income tax was extended all over the German states, for in some of these states it had been the law before to tax people according to the size of their rooms or habitations, judging from them the wealth of the inhabitant. This law was quite as obnoxious as the English window-tax law, and had indeed the same effect, since, while the latter compelled, or, if you please, induced people to reduce the number of their windows, and thus made habitations less wholesome by excluding light, the former tended to make people build their rooms and dwellings generally smaller, and thus made habitations less wholesome by excluding the possibility of ventilation. We may congratulate ourselves that the laws of our country throw no such difficulties in our way, and that, therefore, we architects have only to deal with the irrational objection current amongst so many people to pure air in general, and the necessity of supplying pure air to all people in some form or other.

In regard to this irrational objection, let me quote from a somewhat celebrated work, "Liberty and Law," by the Hon. Britton A. Hill, of St. Louis. He says: —

"Every species of intoxication imparts a fondness for the condition, a desire to recur to the sensations excited by it; and the intoxication produced by foul air is not without this dangerous element, which, indeed, alone can make it possible that men shut out from their dwelling-places God's pure air, as if it were their worst enemy, and yield themselves and their children up to those sensations of drowsiness and stupor which air impregnated with carbonic acid gas invariably excites. Legislation on this subject will, therefore, meet a deep-rooted opposition from the frequenters of dens, cellars, etc.; but in proportion as this opposition has its origin in that same foul air, the law should protect the upgrowing generation from similar results, and make possible the raising of a new generation of children, whose bodies shall be free from the fearful taint."

Permit me also to call your attention to these memorable words, wherein he unwraps, as it were, his whole system of public hygiene: —

"It is the duty of the government to provide pure air for every person, and thus protect even from the contaminating influences of all kinds of miasmatic and other impurities.

"The legislative power in each State must regulate:

"(1.) The laying out of cities and villages in such a manner as to make possible the needful ventilation of their buildings, and providing public drainage.

"(2.) The construction of all private as well as public buildings in such a manner as to make accessible to every inmate the necessary quantity of pure air, and the establishing of private drainage.

"(3.) Personal cleanliness.

"(4.) The laying out of counties and townships.

"To provide, furthermore, all other kinds of food and drink for the human body in the natural condition of healthful purity, the legislative power in each State must regulate:

"(1.) The sale of all food and drinks consumed by man, so as to secure them to the consumer in their unadulterated purity.

"(2.) The preservation of the health of all animals, birds, fishes, and the soundness of all vegetables consumed by man."

This is surely going all the length of sanitary science, and hence we do not need to follow it up, merely residing it to point out the many and intimate relations that constantly occur in life between the architect and the physician; just as such connection occurs so frequently between the artist and the architect, and the landscape gardener and the architect. In reading closely works of ancient architecture it seems almost as if some of the most treasured of its characteristics had arisen purely from hygienic considerations.

RELIGIOUS ARCHITECTURE.[1]

In all countries, in all ages, religious devotion has found its expression in magnificent buildings.

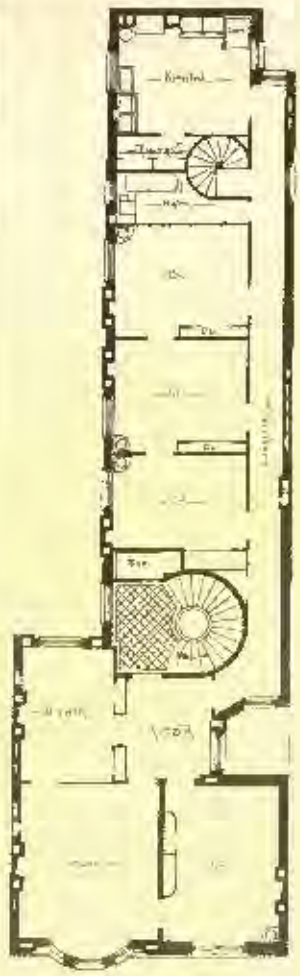
In our own day, in our own country, the desire to be original, the desire to develop a new style, has produced anything but satisfactory results. In the last few years our architects have devoted much time to the study of the theatre, but little to the study of the best ecclesiastical architecture. In their desire to make our churches comfortable they have devoted all their energies to the perfection of the plumbing and the softness of the cushions, and so have left themselves but little time to think of the beauty of holiness. I do not wish to undervalue the importance of light and fresh air, of seeing and hearing, but I do think that important as these things are there are other matters connected with church building that we ought not to leave undone.

Our churches are almost universally built in what is popularly known as the Gothic style of architecture. It is much to be regretted that there is such a thing as bad Gothic, and that it appears with us to be such a universal complaint. In the city of New York we have only one church to which we look with pride, — one church that stands without rival as the embodiment, the expression of religious sentiment; and yet Trinity Church is but an imperfect reproduction of a type common to many of the beautiful parish churches of England. Accepting this as a fact, — and I think few good judges will be found who can deny that this church, built thirty

[1] Papers read at the Eleventh Annual Convention of the American Institute of Architecture, by Mr. C. C. Haight, F. A. I., and the Rev. J. H. Hopkins.

Лист 47-48.

Church of the Trinity and Our Lady of Georgia, Moscow, Russia.



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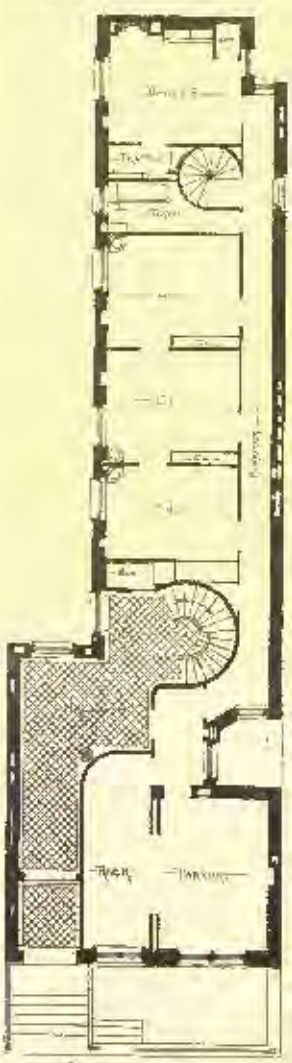

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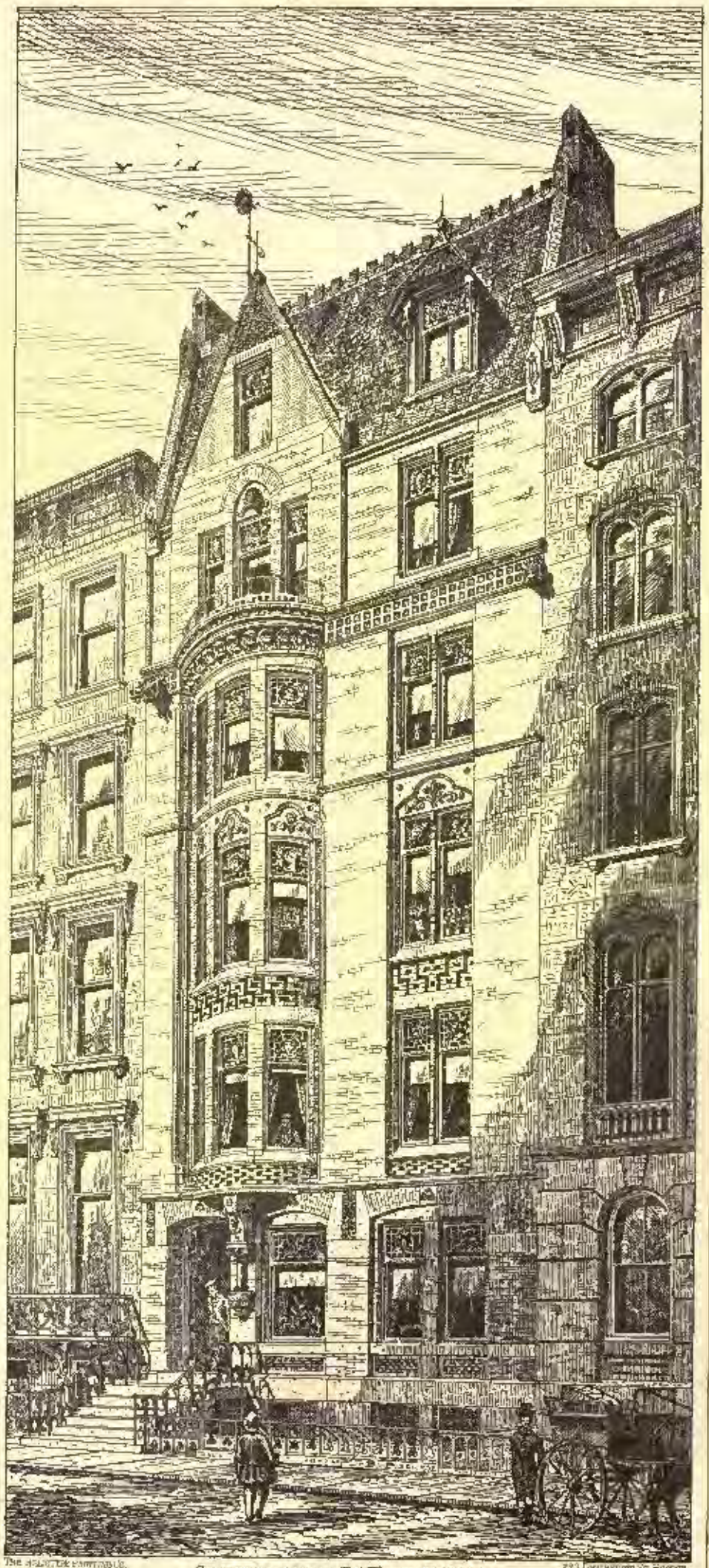

APARTMENTS, 21 EAST 21ST ST.

BRUCE PRICE ARCH'T
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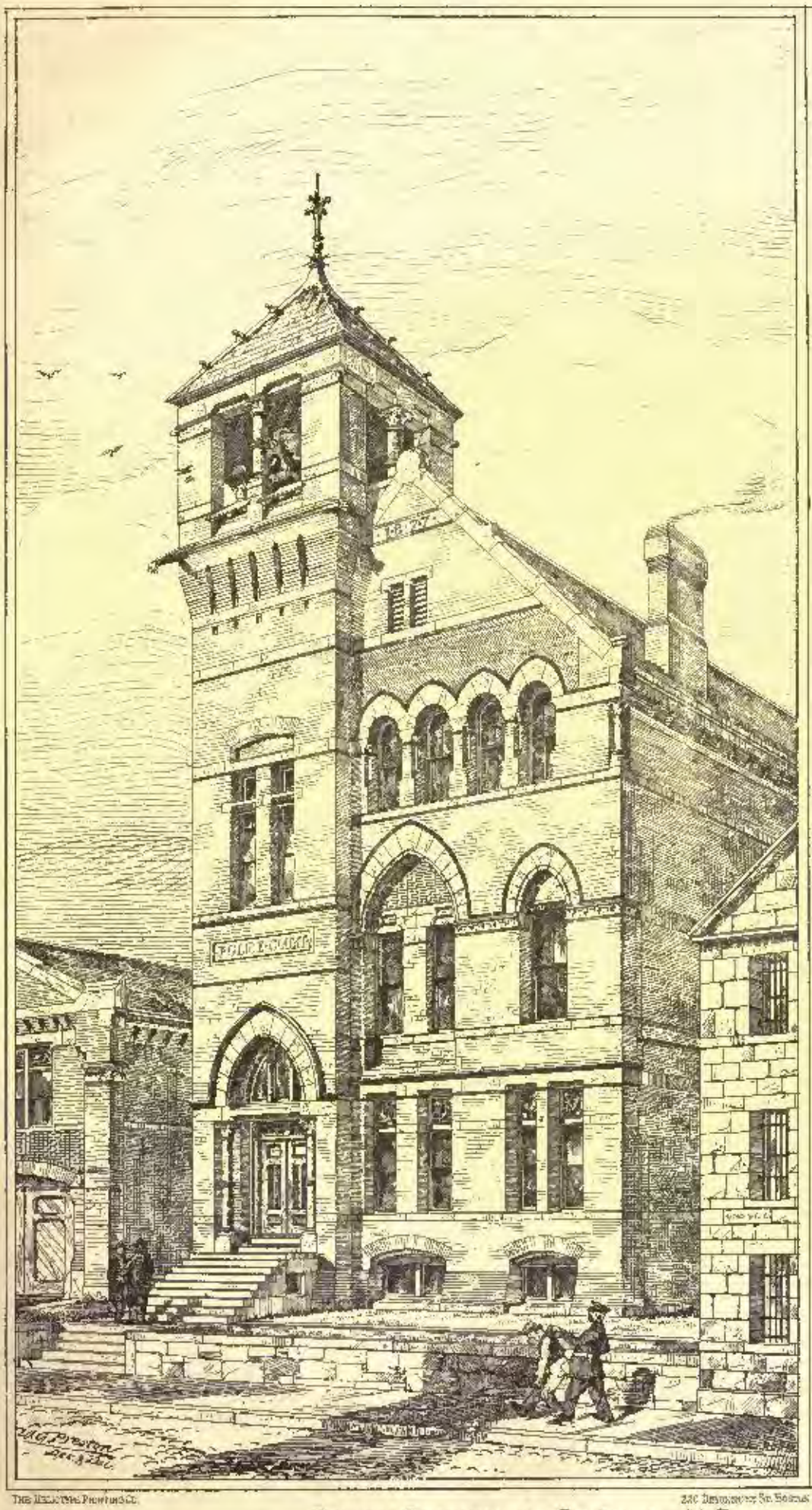
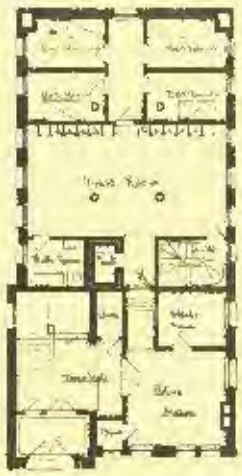
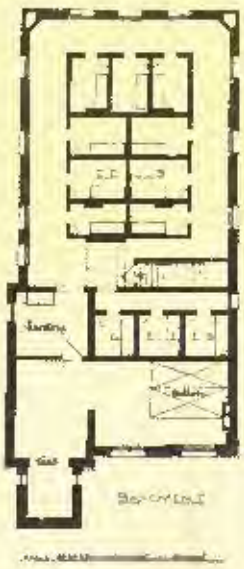






The Heliotype Printing Co. 220 Devonshire St. Boston

— Police Station at St John, N.B. —

— W. G. Preston, Archt. —

American Architect and Building News May 4, 1878. No. 123.

PLATE VII. THREE POINT PERSPECTIVE.

Fig. 24

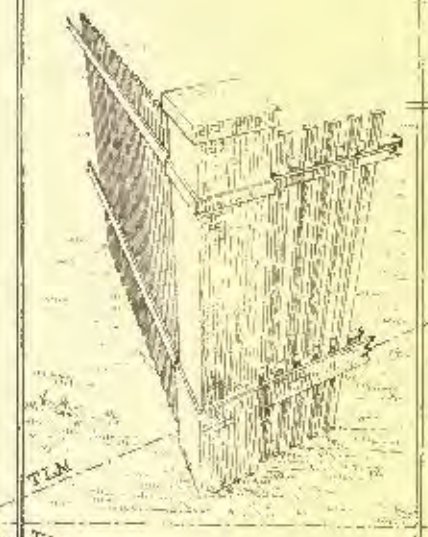


Fig. 25

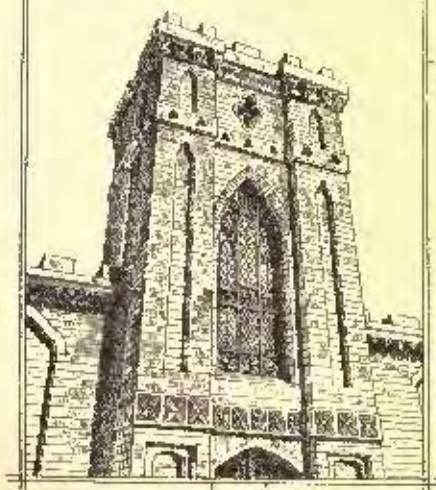


Fig. 30

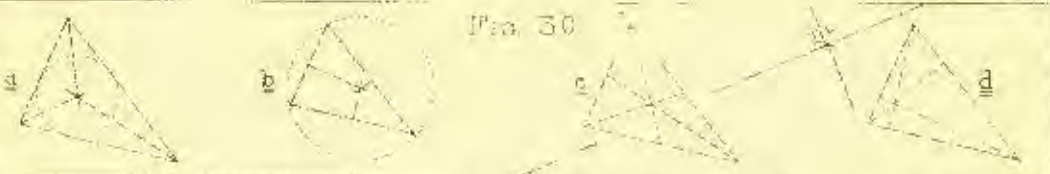


Fig. 27

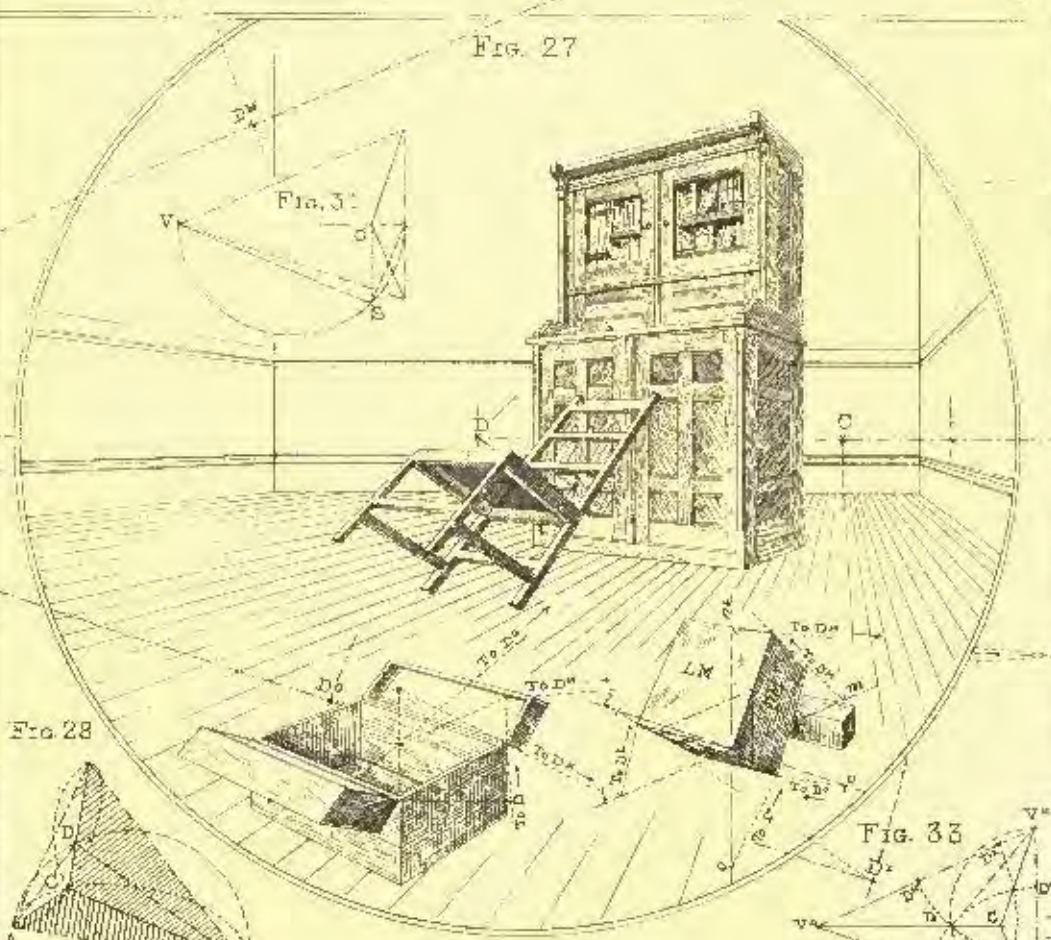


Fig. 31

Fig. 28

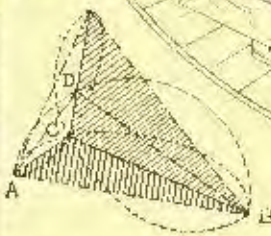


Fig. 33

Fig. 29

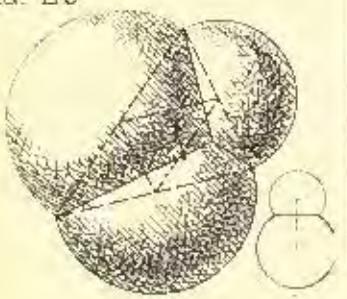


Fig. 32

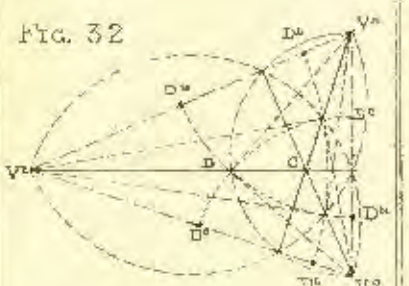
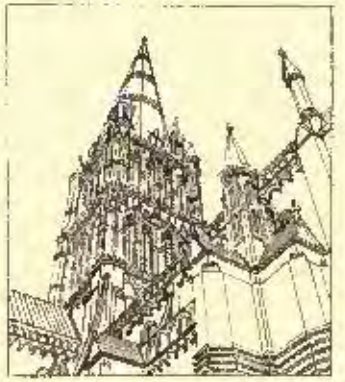


Fig. 26



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years ago, has in this country no equal, in spite of its defects, no superior in its architecture and in the impression that it conveys,— we are naturally led to the conclusion, which I would desire to impress as strongly as I can on my fellow architects, and especially on the younger members of our honorable profession, that before entering upon the practice of ecclesiastical architecture we should study carefully, and as far as possible master, the architecture of the churches of England built in the thirteenth and fourteenth centuries. I believe that if we will faithfully follow this plan we shall create in the future churches far more creditable to ourselves, far more satisfactory to others.

I believe, moreover, that before we can succeed in rivalling the religious architecture of past ages we must get rid of the wretched utilitarian idea that our churches are mere preaching houses; and that until we realize that the church is to be built to the glory of God, that it is his temple, where the faithful come together to worship Him, we can hardly hope for success.

CHARLES C. HAIGHT.

SYMBOLISM THE LIFE OF RELIGIOUS ARCHITECTURE.

THERE can be no true architecture without a thorough adaptation to the purpose for which a building is erected. The Colosseum perfectly expresses its object,— the enabling of 80,000 to see the public shows; and the size and costliness of the edifice embodied the vast importance of the *Circenses*, as indispensable to the popularity on which the pagan Roman empire rested. The Quaker meeting-house is equally expressive of a religion which thinks to arrive at pure spirituality by leaving nothing external except what is bald, bare, and (if possible) drab. The old Roman basilicas express perfectly the fact that the forms of pagan architecture were now occupied by a new and conquering spirit,— the spirit of Christianity,— which was moulding the old elements into new forms and meanings. The Byzantine style shows the further progress of this spirit, until the old forms, lifted to their utmost height, could develop no further without losing their identity. Pointed architecture shows the new spirit victorious over the old, and now-forming every detail as well as all the great proportions and outlines into full harmony with itself. The over-luxuriance of the later Pointed expresses the too great wealth and growing corruption of the church, until it found its Nemesis in the Renaissance. And the modern St. Peter's at Rome perfectly expresses modern Romanism,— the imperial dome testifying to the spiritual imperialism which is its essence, and the old pagan ideas of power being once more dominant, notwithstanding all the influence of Christianity in ground plan, elevation, and detail, everywhere ennobling the whole.

All other styles of great architecture show the same: Egyptian, Hindoo, Assyrian, Mexican,— every distinct style is so, because of the distinct ideas in the religion which thus takes on its proper outward expression.

Too many of our modern architects run through all the various styles, and pick out the pretty things, using them to garnish their work, without any reason, except to tickle the eye. We have sometimes such a medley of odds and scraps as deserves only the description of "architectural hash."

The first requisite, therefore, for religious architecture is that the architect should thoroughly embrace, and be devoted to, the religion which he undertakes to express in external form. As that religion is a historical religion and has a marvellous history from the Garden of Eden until now, so its architecture has a history also, from the pillar-stone of Bethel and the tabernacle in the wilderness, down to our own day and country. The knowledge of the past, and the consciousness of the imperious needs of the present, must both enter into the production of true religious architecture.

The wondrous triumphs of mediæval architects are thoroughly alive, in every part, with religious symbolism. They always meant something, in every leading feature, and almost in every detail. It is utterly idle for any one to attempt to master their architecture from the outside, and make it a mere grammar of mouldings and tracery and other ornament. The Christian dogma underlies it all. The Trinity in Unity, the Incarnation, the Cross, the Holy Scriptures, the Apostles, the Church, the Sacraments, Death, the Place of Departed Spirits, the Judgment, the Life Everlasting,— all these, together with smaller matters of every-day life, are found embodied in innumerable varieties of form, in the churches and cathedrals which are the wonder of the world, and draw men's hearts even when they cannot tell why. The church edifice must really be the embodiment, in stone, of the spiritual church of true believers,— the living stones of that sanctuary which is Christ's body. Until it become such, we shall properly have no religious architecture. We shall have only unprincipled architectural quackery. The first requisite for a "religious architecture" is to have a religion.

J. H. HOPKINS.

ILLUSTRATIONS.

APARTMENT HOUSE ON EAST 21ST STREET, NEW YORK. MR. BRUCE PRICE, ARCHITECT, NEW YORK.

THIS building is designed to have a complete apartment on each floor, planned in such a way as to give external light to every room. There will be five floors of flats, a top floor for servants, and a basement for the janitor. The structure throughout is fire-proof, with iron floor beams, and beam fillings, partitions of the N. Y. Fire Proof Building Company's Lime or Tile tiling, and iron and slate staircases, front and rear. The front is of Philadelphia pressed brick relieved with Dorchester freestone. The cornice of the bay is enriched with terra-cotta foliated work, and the panels of the first story are filled in with tiles of the same material. The roof tiles and ridge tiles are also of terra cotta. The motive of the plan is essentially that of the French flat, so well known to every American who has lived for any time in Paris. The entrance to each flat is from a landing into an ante-chamber; from this, either directly or by corridor, access is had to all the rooms. D. H. King, Jr., has the general contract. The whole will be finished complete, ready for occupation, by October the first prox., at a cost of something under $35,000.

POLICE COURT BUILDING, ST. JOHN, N. B. MR. WM. G. PROCTOR AND MESSRS. SMITH AND DUNN, ARCHITECTS.

Competitive drawings were asked for, in the summer of 1877, by the city of St. John, providing quarters for the police court, lock-up, and a "Temperance Hall." The building illustrated was begun at once, from the premiated design, and is at this time nearly finished. It is upon the highest ground in the city, adjoining the old jail upon one side and the hook and ladder house, some time since illustrated in these pages, upon the other. The building is almost entirely of selected common brick laid in dark mortar, a popular material, as brick always is in cities immediately subsequent to a great fire, the present reaction in favor of stone not having then set in. The basement, which has an asphalt flooring and vaulted walls, contains the cells and heating apparatus, and is mostly above ground on the sides and rear. A prisoners' stairway runs up from the basement and terminates upon the second floor in the prisoners' dock. The first floor contains the office of the chief of police, guardroom, safe for captured valuables, and, in the rear, bed-rooms for the accommodation of gentlemen criminals, or the *jeunesse dorée* of the Provinces who may be found delinquent, and for whom it is thought desirable to discriminate in regard to lodgings. The second floor is devoted to the court-room proper, the clerk's office, lawyers' consulting room, and judges' private room. On the third floor is the Temperance Hall. In the tower is hung a heavy bell connected with the fire alarm telegraph.

CHURCH OF THE HOLY TRINITY AND OUR LADY OF GEORGIA, MOSCOW, RUSSIA.

We regret that we have been unable to find any description of this evidently interesting church, which we here reproduce from the pages of the Russian architectural journal, the *Zodtchy*.

STUDY IN PERSPECTIVE. PLATE VII.

See the "Paper on Perspective" here following.

PAPERS ON PERSPECTIVE.

VII. OBLIQUE, OR THREE-POINT, PERSPECTIVE.

151. THE last paper discussed the phenomena of Parallel Perspective, in which, of the three sets of lines that define a rectangular object, two are parallel to the picture and have their vanishing points accordingly at an infinite distance; the third alone has its vanishing point in the plane of the picture. This may be called accordingly "One-Point Perspective," since it employs only one vanishing point, V^x at C.

152. In the previous papers only one of the principal sets of lines, namely, the vertical lines, were parallel to the picture, both sets of horizontal lines being inclined to it at an angle, one to the right and one to the left. This may accordingly be called "Angular" or "Two-Point Perspective," two vanishing points being employed, V^R and V^L.

153. We now come to a third case, that in which all three of the principal lines of a rectangular object are inclined to the picture, the object presenting towards the eye a solid corner. In this case all three vanishing points are employed, and the drawing may be said to be made in "Oblique" or "Three-Point Perspective." Plate VII. illustrates this case, Figs. 24, 25, and 26 presenting examples in which, though the object is vertical, the plane of the picture is inclined; while in Fig. 27 the picture is vertical, as usual, but the cubical block on the floor, the two covers of the box in the foreground, and the chair, are all tipped so that all their edges are inclined to the picture. They are accordingly drawn in Three-Point Perspective.

154. Fig. 24 shows a post at the corner of a fence as it appears when one looks down upon it, the plane of the picture being inclined backwards at the top. Fig. 25 is a drawing of the tower of old Trinity Church, in Boston, which was destroyed by the fire in November, 1872, as it appeared when one was looking up at it, the top of the picture being inclined forward. Fig. 26 is a similar view of the tower and spire of Salisbury Cathedral, taken from a photograph. The vanishing points in Fig. 24 are at V_1, V_2, and V_3; those of Fig. 25 at V_4, V_5, and V_6, and those of Fig. 26 are not shown, but can easily be found.

155. To make these drawings look *natural*, the paper should be held at an angle, below the eye for the first and above the eye for the

other two. The vanishing points of the vertical lines, V_3 and V_4, should be just above or below the eye.

156. Fig. 27 illustrates all three kinds of perspective, the room being drawn in parallel perspective, with only one vanishing point, at C; the book-case and the box in angular perspective, with two vanishing points, at V^a and V^b; and the lids of the box, with the chair and the cubical block, in Three-Point Perspective, with vanishing points at V^a, V^b, and V^c. The three sets of planes, as marked on the cube, are of course L M, L O, and M O; and their traces T L M, T L O, and T M O form a triangle lying between the three vanishing points.

157. A plane of measures is supposed to pass through the nearest corner of the cube. In this lie three lines of measures, *l m*, *l o*, and *m o*, parallel to the three traces. (79.) On each of these lines the real length of the edge of the cube is measured off, giving the six points *l*, *l*, *m*, *m*, *o*, *o*. These dimensions are transferred to the three edges of the cube, L, M, and O, by means of the points of distance D^a, D^b, and D^c, which indicate the distance of each of these vanishing points from the station point, S, in front of the picture, opposite C. Each of these occurs twice, once on each of the horizons that meet at its vanishing point. (120.)

158. In the same way the width of the box is laid off on a vertical line passing through its front corner, and transferred to its right-hand edge by means of D^a, in the trace T M O or T R Z. Half the width of the box, which is the width of each half of the cover, is transferred to the inclined lines of the cover, directed to V^a and to V^c, by means of the points of distance D^a and D^c, on T M O.

159. This is all exactly in accordance with what has been done in previous cases, and involves no new principle. The only new question which oblique perspective presents relates to the position of the station point, S, of the centre, C, of the various points of distance, and of the three vanishing points. Their relations are obviously much more strictly defined than in the previous cases. For in One-Point Perspective, the vanishing point, C, being given, the station point may be any where upon the axis, a line passing through it in a direction perpendicular to the plane of the picture. In Two-Point Perspective, the vanishing points V^a and V^b being given, the station point S must be somewhere on the circumference of a semicircle whose diameter lies between those points, and which is, itself, in a horizontal plane perpendicular to the plane of the picture. But any point in this semicircle will do. In Three-Point Perspective it must in like manner lie somewhere in the circumference of each of three semicircles whose diameters are the three sides of the triangle formed by the three vanishing points. For since the three edges of the rectangular object form right angles with each other, the lines drawn from the eye to the vanishing points parallel to those edges must also be at right angles with each other. These three lines in fact, together with the three traces, form a triangular pyramid the vertex of which, at S, is composed of three right angles. This pyramid is of the same shape, obviously, as the small triangular pyramid that would be formed by cutting across the corner of the object represented with a plane parallel to the plane of the picture. The lines of intersection in each plane would of course be parallel to the trace of that plane. (80.) The corner of the cube in Fig. 27 is represented as cut across in this way.

160. Now it is obvious that only one such pyramid can be constructed upon a given triangle as a base; that is to say, given the three vanishing points, the position of the point S is absolutely fixed; there is only one point at which the eye can be placed and find each pair of vanishing points 90° apart. Fig. 28 illustrates this, the semicircles that contain the three right angles being foreshortened into ellipses.

161. Another way of regarding the problem is to consider that, since the plane in which each semicircle lies is not perpendicular to the picture but is inclined to it at an unknown angle, the position of the station point is really limited only by the condition that it must lie somewhere in the surface of a hemisphere of which the given trace is a diameter. As this is true for each of the three traces, the station point must be a point common to the three hemispheres. Now three hemispheres whose diameters form a triangle can have but a single point in common. Two of them will intersect each other in a semicircle perpendicular to the plane of the triangle, and the point where this semicircle is cut by the third hemisphere will be the point in question. Figure 29 illustrates this view of the subject.

162. It is plain from an inspection of the figure, and of the little figure alongside, that the small semicircles in which these hemispheres intersect will be projected as straight lines at right angles to the lines connecting their centres. But as the lines connecting the three centres are obviously parallel to the three diameters, it follows that the three straight lines in which these three semicircles are projected and which meet in the point C, the projection of the apex of the pyramid, are drawn from the corners of the base perpendicular to the opposite sides. This affords an easy method of determining the point C.

163. This proposition, that the projection of each edge of the pyramid is perpendicular to the opposite side of the base, is in fact merely an illustration of the familiar proposition that if a line is normal to a plane, its projection upon a second plane intersecting the first is perpendicular to the line of intersection. Each edge of the pyramid is obviously normal to the opposite face of the pyramid, and its projection upon the base must accordingly be perpendicular to the opposite side of the base, where the face of the pyramid cuts it.

164. *Note.* This is not the place to demonstrate the proposition, of which the demonstration is to be sought in the treatises on plane geometry, that perpendiculars let fall from the vertices of a triangle upon the opposite sides will meet at a point. But it is worth while perhaps to observe that this point of symmetry within the triangle is only one of four such points, the others having (*a*) the centre of the inscribed circle, (*b*) the centre of the circumscribed circle, and (*c*) the centre of gravity. Fig. 30 *a*, *b*, *c*, *d*, exhibits a comparative view of these four points.

165. The point C being thus ascertained, it only remains to determine the height of the pyramid, that is, the distance of the station point S in front of the picture, and the length of the three edges of the pyramid, that is to say, the distance of the station point from the three vanishing points.

Fig. 31 shows how these distances may be determined. A plane perpendicular to the picture is passed through either edge of the pyramid. Its intersection with the opposite face and with the plane of the picture, or base of the pyramid, will form a right-angled triangle. This triangle, when revolved about its hypothenuse into the plane of the picture, will give V S, the length of the edge in question, and the height of the pyramid, or distance of the eye from the picture, C S. This operation is repeated on a larger scale in Fig. 27, giving S_1.

166. Fig. 28 shows how the distance of the eye from two vanishing points, that is to say, the length of two edges of the pyramid, can be found at once by revolving one of its triangular faces into the plane of the picture. Each semi-ellipse becomes a semicircle, on the circumference of which is found the station point in its revolved position at D, and D A and D B are the length of two of the edges.

167. Fig. 32 exhibits the curious geometrical relations that result from the application of this process to all three faces at once. It will be noticed that the two semicircles that start from each vanishing point meet and intersect on the opposite trace, just at the point where the perpendicular drawn from the vanishing point in question through the centre, C, strikes it. If now, from each vanishing point as a centre an arc be drawn with a radius equal to the distance of that vanishing point from the station point, each arc will be the *locus* of its point of distance, and the intersection of these arcs with the traces will give the six points of distance sought. Moreover, each of these arcs will not only pass through two out of the three revolved positions of S, but its points of intersection with the other two arcs will lie in the perpendiculars let fall from the other two vanishing points upon the opposite traces.

168. This last observation gives the means of determining all six points of distance by revolving into the plane of the picture only a single one of the faces of the pyramid, as is illustrated in Fig. 33. If the triangle V^a S V^b, right-angled at S, is revolved around V^a V^b, S will fall at D, and the points of distance D^a and D^b, two of each, are easily determined, V^a D^a being equal to V^a D, and V^b D^b to V^b D. But the *locus* of D^c passes through the point where the arc D^a D D^b cuts V^a C, and also through the point where D^b D D^a cuts V^b C. V^a D^c, then, is easily determined, and the two points D^c ascertained without further labor.

D, which is D^a, since D V^a is obviously equal to S V^a, enables us to determine another D^a just below V^c.

The several points of distance in Fig. 27, to which Fig. 33 is similar, are obtained in this way.

169. The phenomena of intersecting planes, with the vanishing points of their lines of intersection at the intersection of their traces, are the same in Three-Point as in Two Point or in One-Point Perspective, and need not again be illustrated. So also with the problem of finding the vanishing point of a line lying in a given plane and making a known angle with a line in that plane whose vanishing point is known. The two vanishing points will both lie in the trace of the given plane, and if the station point is revolved about that trace till it comes into the plane of the picture, lines from the station point to the two vanishing points will make with each other the angle in question.

The next paper will treat of the perspective of shadows.

CHURCH ARCHITECTURE.

111 Broadway, New York, April 24, 1878.

To the Editor of the American Architect:

Dear Sir, — I have no wish to enter the field of controversy with my professional brethren on the subject of the church architecture that we need, but feel it to be but just to state that the paper prepared by me on that subject was written under a restriction of the time of delivery to twenty minutes, and for a body composed in great part of the members of the Protestant Episcopal Church, whom therefore I chiefly addressed.

I cannot believe that any one is of the opinion that architecture is now or ever will be finished, or that copyism is all that is left to us. Copyism is the elementary school that we must go through in order to gain the knowledge and power necessary to develop our originality.

If we start from a basis of originality, pure and simple, we shall soon find that though a Pegasus may be a good thing, it is infinitely

more useful when harnessed. There is plenty of room within the traces for his original capers, and the world sees with satisfaction that much more real work is done. No doubt it is a grand thing in theory to say that as to the past we will have none of it; that we will be original, — a law unto ourselves. A representative in Congress, when it was said during the early days of the war that all history proved a proposed measure to be impracticable, replied, "What do we care for history? We are *making* history!" So the yearning for originality in our art elicits the cry, What do we care for previous architecture? We are making architecture! True enough, in one sense; we are moving onward, building on the foundations already laid for us; only thus can we progress. We are not copying. Tennyson does not copy Shakespeare, who in his turn did not imitate Chaucer; they developed from a common root. We are doing the same, and those who come after us will develop from our work.

It seems to me that we use, generally without knowing it, the word "originality" in two senses; in one case to express entire emancipation from every rule, in the other to describe the discarding of rules which have become useless from their nature; in one case as synonymous with revolution, in the other with progress and reform. Until a single definition of the term is agreed on, all discussions in which it is obliged to be used will be somewhat complicated.

Yours very truly, ENLEN T. LITTELL.

THE PROBLEM IN ACOUSTICS.

EDITOR AMERICAN ARCHITECT AND BUILDING NEWS:

Sir, — Regarding W. B. A.'s communication in your issue of the 20th ult., I observe that the proportions of the dimensions of the auditorium are not harmonic, and therefore likely to aggravate any tendency to reverberation, etc., arising from other causes, of which there may be a combination, producing the experience complained of (though not specified). Therefore I would suggest to your correspondent, when he gives you further particulars, to include, amongst others, the following, namely, mention if the walls show dampness; also, if the experience alluded to is observed alike when the auditorium is fully occupied by auditors, or which parts are unoccupied; also, if the pews are solid-backed, the seats cushioned, and if the floor is carpeted; also, the shape of the gallery plan, etc.; also, materials of partitions (if any) on each side of the gallery (which is two thirds of width of auditorium) extending up to the main ceiling (if so); also, the nature of the recess in rear of the pulpit; also, to state the precise nature of the disturbance, as it may afford a clue to the surface producing reflection, etc. It is quite likely that some share of the trouble is aggravated by the cross current caused by ventilation to the side flues, which will, no doubt, disturb the air, — probably most about the centre of the middle tier of pews, — the radial distances there being shortest. The first experiment, as being the readiest, to discover the fault is to try changes of position of the speaker, also of the direction of casting his voice into the auditorium. If the floor is uncarpeted, there may be something in the basement in sympathy with the noise. ALEX. BLACK.

FLOORS OF STABLES.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — I have seen it stated in a French paper that in cases where asphalt had been used for the floors of pig-pens, the urine of the pigs very soon caused the asphalt to rot away, while the portions of the floor acted upon by the urine of horses were unaffected. Although the urine of horses is not so strong as that of swine, it may possess properties injurious to cement concrete, and as I am thinking of flooring a barn cellar with either concrete or bricks, it would help me to a decision if those of your readers who have any knowledge of the way in which concrete is affected by the action of the acids and gases of a manure heap, will tell me their experiences, and what precautions can be taken.

Very truly yours, V.

ENGRAVINGS.

IT is not sufficient that we paper or tint our walls, grateful as may be the color so employed, for that is but a background, a foil to relieve the pictures or prints we hang there. But we cannot all have pictures, for they are costly, and only those who have ample means can afford such luxuries. Poor pictures, cheap pictures, are worse than none, and if we cannot have the good we had better be without the bad. Fortunately, when we come to this conclusion, we are not wholly without art resources, for there are prints of surpassing beauty at our command, and we have no excuse in these days for not indulging in good specimens of the engraver's art. Prints, once so costly that only the wealthy could own them, are now brought within the reach of all. Photography has come to our aid, and, better still, the heliotype has given us such faithful copies of the finest efforts of the burin as will satisfy the most exacting demands. Chromos, too, are produced with a fidelity and a cheapness that has recommended them, in spite of their abuses, to thousands who, while they appreciate the truthful rendering of light and shade in an engraving, would add to it the charm of color — would make of it the counterfeit presentment of the master they had learned to admire, but whose originals are beyond their reach.

There is a world of enjoyment in a good engraving, and in these latter days we have far greater opportunities to gratify our tastes in this respect than were afforded our forefathers. The engraver's art was to them almost unknown, save in the production of some elaborate work that required years of labor, and which could only be published at great cost. The art of those days was the art of the "Old Masters," and the subjects selected for engraving were drawn from either the sacred or the classic school. Pictures depicting scenes from the ordinary walks of life were never engraved, and if the burin was occasionally withdrawn from the portrait of a saint, or the attributes of some heathen god, it was transferred to a landscape by a Wilson or a Poussin, for which, at best, there was but a limited demand. But when men were brought face to face with the daily events of life in the extraordinary engravings of Hogarth, it was a new revelation, a new development in the world of art. And so when Bewick's wood-cuts first made their appearance. Accustomed as we are to our portfolios of fine engravings, and our profusely illustrated papers, magazines, and novels, we cannot appreciate the value that was set on his cuts of "The Old Hound," in 1790, and the "Birds of Great Britain," in 1804. Wood engraving was then but little known, but it at once assumed the honorable position it has maintained to this day. We may well value it. A fine line engraving we cannot but admire, for it is the highest development of the engraver's art; but while we recognize its worth, and are cognizant of the fact that no other style has been able to compete with it, we cannot forget how much we owe to wood engraving, or how, in one sense, we have in these little blocks of wood more of the spirit, the touch of the artist, than in the laborer products of the burin.

The engraver on copper or steel makes his own reduced copy of the picture before him. However faithful he may be, the lines on his plate are essentially his own, and although he is telling the artist's story, he can only do it in his own way. But on the block of wood, or in the heliotype, from the original sketch, the artist tells his own story. It is he who makes the drawing, and it is he who gives it life and spirit. All the lines are his own, all the delicate manipulation comes from his hand, and the skill of the engraver (in the matter of wood engraving) is shown in preserving these lines, that they may be faithfully reproduced when they go to press. It is this individuality in the work of those who draw on wood that enables one to recognize the hand of any leading artist at a glance. Men like Leech, and Meadows, Gilbert, Harvey, Darley, Doré, and Foster come to the front the moment we call to mind the best in their several walks. But while these answer the end for which they were designed, we need something more for our walls, and, fortunately, without going to an extravagant outlay, we can command copies of the finest works that have come from the engraver's burin or the etcher's needle, — copies of the exquisite line engravings of Raphael Morghen and the masterly etchings of Rembrandt and others who have done so much to elevate the art to which they were wedded.

CHAMPLIN.

OUR COMPETITION DRAWINGS.

WE find that some perplexity has been caused by want of correspondence between the award of premiums in our competitions and our choice of the designs for illustrations. This is to be explained by the fact that the editors have thought it best not to take any part in the awards, but to depend on the kindness of architects of experience and standing who are accessible to them. The selection of subjects for publication has therefore been made independently of the award of the committees, and since it is not always convenient for these gentlemen to meet and decide upon the designs at a given moment, it has been made without waiting for the award. Under these circumstances it may easily happen, when the merits of several designs are pretty evenly balanced, that one selected for mention by the committee has been omitted from the illustrations, or that they may fail to honor with a mention some which have been illustrated. Both of these things, in fact, happened at the last competition. We shall make it a point, however, when we are not prevented by want of room, to illustrate those which are mentioned by the committees.

NOTES AND CLIPPINGS.

ELEVATOR ACCIDENT. — The fall of an elevator in the building of the Howe Sewing Machine Company, in Chicago, on the 22d ult., shows how good a thing it would be if each elevator were marked plainly with the weight it could carry safely. Had the elevator in question been so marked, it would have saved ten men a drop through eighty-five feet, and a shock which left only one unhurt.

AN ARCHITECT'S SUIT FOR HIS FEE. — When the Northern Hospital for the Insane was ordered built at Oshkosh, Wis., Col. S. N. Shipman, an architect, then of Madison, Wis., but now of Chicago, prepared plans and specifications for the main building and one of the wings, and was appointed supervising architect of the building, but soon after the work was begun Colonel Shipman was removed, and another architect assumed the superintendence. Colonel Shipman, therefore, sued the State for a percentage on the contract price for the whole building, including all the latest wings. His account with interest footed up about $10,000. After being twice before the supreme court, which decided he could sue for a percentage on the first contract, it was sent down to the Dane County circuit to be tried on a question of facts. A jury has just returned a verdict for the sum of about $6,500.

The Architect of the Capitol at Washington. — The House Committee on Public Buildings and Grounds, before whom charges were presented last month against Mr. Edward Clark, architect of the Capitol, have unanimously dismissed them, after thorough examination, as trivial and unfounded.

How Gaslight is Lost. — Computations of the loss of light by shades of different kinds have been brought together by Professor Chandler, and are presented in a pamphlet entitled "How to Burn Gas." The lowest absorption of ground glass is nearly 30 per cent; there is only one specimen at this low figure, other shades of that kind absorbing more than 62 per cent. Opal glass causes a loss of 53 to 56 per cent; green, purple, and ruby glass, 82 to 89 per cent; a porcelain transparency, over 97%.

The Statue of Liberty. — M. Charles Blanc, the incumbent of the newly instituted chair of æsthetics at Paris, has written approvingly of the immense statue of Liberty which M. Bartholdi is founding, with the expectation that it will, when finished, be placed on Bedloe's Island, in New York harbor. We had understood that the statue was to be the gift of M. Bartholdi individually; but from the fact that efforts are making to raise the $116,000 that are needed to finish the statue, it is evident that there are others associated with him in the enterprise. What progress is making in New York towards raising the money for building the pedestal we do not know. It is certain, though, that if New York will not take it, there are other cities which will; for, just as the city of Glasgow was eager to buy the Needle of Cleopatra, if money could not be raised in London to pay the salvage awarded by Sir Robert Phillimore, so Philadelphia has announced herself ready to place the statue of Liberty in Fairmount Park. It is said that M. Viollet-le-Duc is engaged in assembling the pieces of the statue.

New Government Buildings. — The House Committee on Public Buildings and Grounds is said to be inclined to take favorable action on several of the many bills asking for appropriations for new public buildings. To make a judicious selection is no easy task, for the favoring of one city to the prejudice of another might, as politics go, endanger the passage of the bill giving final authorization to build. It has hitherto been the custom to appropriate money each year for the building of not more than four new buildings, and as there are more than thirty cities which desire to have new public buildings, it can be only by careful dickering that the selection can be made. Amongst the ones which are most likely to gain their wishes are Quincy, Ill., Kansas City, Mo., Pittsburgh, Penn., Brooklyn, N. Y., Council Bluffs, Iowa, Louisville, Ky., Augusta, Ga., Charleston, W. Va., and Jackson, Miss.

Communism in San Francisco. — It is said that the agitator Kearney has had a downfall. Archbishop Alemany had exhorted all Catholics to avoid all riotous proceedings and to have nothing to do with fanatical mischief-makers. At the next workingmen's meeting Kearney, after a frenzied tirade against the priests, the creed, and the church itself, declared that he and his followers threw off all allegiance to the Catholic Church. It is thought that he has gone too far, and has sacrificed the adherence of the Irish Catholics, who form the greater part of his following.

An International Courtesy. — The Consul General at Berlin informs the state department that the Prussian minister of commerce has addressed a communication to the director of the School of Mines at New York, to the effect that those American engineers of mining and of smelting works and foundries who may desire to visit the establishments in Germany appertaining to their business, in event of their attending the Paris Exposition, will find arrangements made for their information and guidance at the Royal Academy of Mines at No. 6 Lustgarten, Berlin.

Mr. Whistler's House. — The *Examiner's* remark that the Board of Works is vainly trying to induce Mr. Whistler, the artist, to modify the eccentric design of the house he is building at Chelsea, makes one wish to know what particular whim it is that this supposed-to-be all-powerful body is unable to prevail against.

Strike. — Two hundred plumbers of Edinburgh, Scotland, have struck, because the masters have ordered that the men must walk to the jobs, within the city limits, in their own time.

Archæological Discovery at Rome. — At the corner of the Via Nazionale and the Via Magnino a well-preserved mural decoration in mosaic has been discovered lately. It represents a large galley under full sail at the moment when it is passing between the jetties of a noble port. The quays are furnished with stairs for debarkation, and on one side is a mole built upon arches and their supporting piers; upon this is a light-house, of which the lower story is rectangular and the upper story cylindrical. The coloring of the mosaic, which measured about seven feet by six feet, is said to be singularly bright.

The Treasures of the Tiber. — It has been decided at last to begin the examination of the bed of the Tiber with the hope of reclaiming the works of art that are supposed, perhaps not unjustly, to have been cast into the river at the times of the various sieges Rome has sustained. It is not stated what means are to be taken, but it is plain that the task will be no easy one, for not only is it probable that the *débris* of the ruined city may have fallen into the river and choked up its bed in the same way that it has encumbered streets and forums, but it is possible that the course of the river may have been wholly changed by such obstructions and by the wearing of the current. It is, moreover, certain that the deposit that the "yellow" Tiber has formed during the centuries since the treasures were given to its keeping is not to be disregarded in considering the difficulties that lie in the way of the proposed search.

Crossing the Sahara. — We have heard often of more absurd and impracticable engineering schemes than that of M. Paul Soleillet, who proposes to build a railroad across the desert of Sahara to Timbuctoo, at a cost of some $800,000,000.

Iron-Clad Fortifications. — If M. Viollet-le-Duc should ever see fit to revise and enlarge his *Histoire d'une Forteresse*, he would find a text for a new chapter in the fact that the German government is adopting for some of its forts the system of armor plating, which has proved to be efficient on the fortifications at Metz and Geestemünde on the Weser. The new forts at Strasburg, Cologne, and Ingoldstadt are to have armored turrets and batteries. The armor for each turret consists of six or eight large plates, which are fastened together in a way that employs neither bolts nor rivets. The armor is made of plates of hardened cast-iron, which in the land defences are fifty-five centimetres or about twenty-one inches thick, and in the coast batteries from sixty to ninety centimetres, or about twenty three to thirty-four inches; while the plates forming the roof of the turret are sufficiently thick to resist the shells fired from twenty-eight centimetre howitzers. Each turret mounts two pieces of ordnance; twenty-six or twenty-eight centimetre guns being used in the coast defences and fifteen or seventeen centimetre guns in the inland fortifications. The embrasures are as small as possible, and the turrets are revolved by manual labor. The cost of each turret in the land fortresses will amount to $50,000, and in the coast defences to $75,000. Experiments have been made upon one of the turrets erected on the range at Tegel, near Berlin, and the results were highly satisfactory, more than five hundred projectiles striking the armored tower without doing it any appreciable damage.

The Riches of Africa. — Captain Burton, the African explorer, has returned from his trip to the Land of Midian, undertaken at the instance of the Khedive, and has brought with him, in the twenty-five tons of mineral ores, substantial proofs of the fatness of the land. These ores are ores of gold, silver, copper, tin, and lead; besides these he found three deposits of sulphur, three turquoise mines, and extensive deposits of salt, saltpetre, and gypsum. Such discoveries as these enable one to comprehend and believe more readily the stories of Oriental magnificence. They will, too, do more toward opening up Africa than the efforts of any number of missionaries. We hope that either Captain Burton himself or some of his companions has been able to make intelligent notes upon the ruined cities, aqueducts, fortresses, and artificial lakes which they report as existing in the country they have explored, as it would be interesting to compare them with the discoveries Dr. Le Plongeon is making in Central America.

Tapestry in the Vatican. — It is said that Leo XIII. has given orders to have the large quantities of tapestry which now lie hid in drawers and cupboards in the Vatican rummaged out, and hung in chronological order along the galleries, where they can be seen. There will be many interesting pieces among them: a quantity of Gobelins, as the French court for a long time made a present of a piece every year to the reigning pontiff; pieces of the Flemish school of the fourteenth and fifteenth centuries, and several of those designed by Raphael, which were saved in the sack of Rome. It would be a good thing if the Italian government or court would follow the Pope's example; for, hidden away in cellars and back rooms of the Pitti Palace, at Florence, there are known to be piles of old damasks and brocades, falling to pieces for want of looking after and bringing to the light; they cannot be sold — though many artists and others would gladly buy them — without superior orders, and it is said that the only purpose they serve is to be torn up when dusters are required and nothing else is handy. — *Pall Mall Gazette.*

How to clean an Oil Painting. — Herr E. von Bibra describes in the *Journal für praktische Chemie* a method used in cleaning an oil painting. The painting, which was, from various causes, very indistinct, was first dusted with feathers and washed with a sponge wet with water; this was followed by a thick lather of shaving-soap, which, after eight minutes, was washed off and the picture allowed to dry. The next step was a thorough cleaning by a linen cloth soaked in rhein-benzine. The picture at this stage was clean but dull colored. Olive oil was used to freshen the colors, and a coating of quick drying varnish was applied last of all to fix permanently the restored colors.

An Engineering Craze. — The *Virginia City Enterprise* reports that an Englishman in Nevada proposes, if $250,000 can be raised, to bore two artesian wells, eighteen inches apart, the one a six and the other a four inch bore, to the depth of 6,000 feet. Then he will drop into one a powder cartridge wrapped in asbestos, so that subterranean heat will not explode it until it reaches the bottom. The explosion then will unite the two wells, and water poured down one will be converted by subterranean heat into steam and sent out through the other, where the power can be transmitted to any required point.

A New Explosive. — A new explosive agent has been discovered by Professor Emerson Reynolds in the laboratory of Trinity College, Dublin. It is a mixture of seventy-five per cent of chlorate of potassium with twenty-five per cent of a body called sulphuret. It is a white powder which is very easily prepared by the mixture of the materials in the above mentioned proportions. The new powder can be ignited at a rather lower temperature than ordinary gunpowder, while the effects it produces are even more remarkable than those caused by the usual mixture. It has been used with success in small cannon, but its discoverer considered that its chief use would be for blasting, for shells, for torpedoes, and for similar purposes. Professor Reynolds pointed out that one of the advantages this powder possesses is that it can be produced at a moment's notice by a rough mixture of the materials, which can be stored and carried without risk so long as they are separate.

Building Accident. — At Cincinnati, on the 22d ult, the wall of a stable, which had been known as unsafe, fell and injured three persons. The immediate cause of the fall was that a portion of the wall had been cut away to make way for a new house that was building on the adjoining lot. The remaining wall was shored up, but the bricks of the portion taken down, which were piled against it, seem to have pushed in the foot of the wall, — which was only eight inches thick, — and caused the wall to fall outward.

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As has been the fashion with international exhibitions, that of this year is opened at the appointed time rather nominally than really, being by no means in order. Even the French exhibits are said to have been a good deal behindhand, though some smaller displays — the Swiss, Japanese, and Chinese, for instance — were entirely ready. The presidency of the Prince of Wales has stimulated the English to extraordinary exertions, and the telegraph, on the opening day, reported their department as the best arranged and most promising, — excepting the French, we presume. It is due to the energy and organizing ability of the American commissioner that the negligence of Congress has not left our country far behind the rest. As it is, although the American exhibit is very much slighter than it should have been, from shortness of time and of money, it is in forwardness not behind some others. It may probably surprise foreigners to be told that a nation of forty millions of people could not spare from its standing army in time of peace, on special invitation, soldiers enough to mount guard in a building fifty feet square; but the telegraph assures us that the marines who were detailed for this duty made a creditable appearance. The American display of tools and machinery is said to do us credit; and we are told that our exhibition of pictures is better than at any previous world's fair. There are some hundred and twenty of them, including a few water-colors. Two thirds were selected by the jury in New York; the rest are the contributions of American artists in Europe. We are sorry to learn that the Americans in Munich have sent no paintings.

In spite of the predictions of the opponents of the scheme, the threatenings of war, and the machinations of the political adversaries of the republic, who are even reported to have tried during the month of April to bribe the mechanics to abandon work on the buildings, and so bring the undertaking to naught, by preventing their completion, the exhibition of 1878 has at length become an actuality. Coöperation, subdivision of labor, and that light-hearted energy peculiar to the French have accomplished the heavy task of preparing suitable buildings for the largest and best-ordered world's fair that has yet taken place. Of the principal buildings, of which we have spoken already, and of which the daily papers have given frequent descriptions, it is useless for one who has not seen them to attempt to speak critically. It is not to be expected that with an appropriation of only about seven million dollars, out of which a permanent building of the size and avowed architectural pretensions of the Palace of the Trocadéro was to be built, much could be done to make the main building an artistic or imposing construction in anything save size. Its designer and builders may be content if it serves its purpose and is a structural success. Those who visit the exhibition for architectural purposes will probably find more to interest them in the numerous buildings typical of their several countries, which are scattered through the exhibition grounds. These have been designed with unusual care and cannot but prove instructive. Among the most interesting are the Moorish palace, containing the Algerine exhibition, the river front of which will reproduce the façade of the mosque of Sidi-Ben-Medineh at Tlemcen; the Chinese and Japanese buildings, each built by native workmen; and, to Americans, the five English buildings — the pavilion of the Prince of Wales, designed in the Elizabethan style, a half-timbered house designed by Mr. Gilbert Redgrave, with richly carved woodwork, a terra-cotta building furnished by Doulton and the Shoolbreds, a Queen Anne house designed by Mr. Norman Shaw, and another building designed by Mr. Colcutt.

The explosiveness of flour-dust when diffused through the air, of which we made mention at the time of the explosion of the Greenfield candy factory in New York, has apparently received a startling illustration in the destruction of the flouring mills at Minneapolis. The manner in which the accident occurred can never be made clear, for every man perished who was in the great Washburn Mill where the first explosion occurred; but no other cause than the flour-dust has been seriously argued, so far as is known. The material which could by its detonation throw down in an instant all four solid stone walls of the great mill, more than a hundred feet square, and lift the roof bodily some hundreds of feet into the air, must have been pretty thoroughly diffused throughout the building. The most violent fulminate placed in any part of the mill could hardly have done this; in fact, the more violent it was the more sure it would be to tear away from the rest of the building the parts immediately about it. There was no explosive known to be in the building but the dust of flour, and certainly there could have been none other diffused through it, but this was everywhere. The risk of such catastrophes in flouring mills has become pretty well known, and it is said that in the Washburn Mill great care was taken to guard against it by prohibiting open lights, since the mill had before narrowly escaped being destroyed by the use of them. It is therefore likely that in this case the disaster was the result of some act of carelessness. It must come to be admitted, we fear, that men engaged in fine milling do their work in an atmosphere almost as dangerous as the fire-damp of coal-mines. The loss of seventeen lives and a million of property may probably be enough to make those who have witnessed it careful henceforth, and there are doubtless adequate precautions where people are watchful. But against the carelessness of men there is no ultimate protection.

Perhaps the accidents that have occurred during the rebuilding of St. John are no more frequent nor severe than might be expected in a city where until lately there has been no building law, and where circumstances have compelled the employment of unknown architects and mechanics, who in some cases have proved to be but little better instructed in the proper ways of doing their work than the owner, who too often undertakes to superintend and direct the work himself. We have an example in the warehouse, already occupied, which was wrecked on Thursday, May 2. The third floor fell, being overloaded by the goods of the tenants, who were manufacturers' agents. The mason who built the building claimed that he and the carpenter remonstrated with the owner for allowing such light floors to be put in, but his warning was disregarded and the floors were put in as directed by the architect. The *Telegraph* states that the joists of the first floor, which were twelve inches deep, had a bearing of twenty-five feet and were "supported by wooden columns, and built up from the rock were brick piers, these, however, being carried up but one story." No warning of the coming catastrophe was given, the floor falling all at once and carrying with it into the cellar the two floors below it and the goods upon them. The walls of the building were not disturbed nor were the windows even broken. Laying aside the consideration of the proper or improper construction of the floor, this accident furnishes one more illustration of the need there is, as we have before said, that the architect should furnish the owner with a statement of how great a weight each floor in the newly finished building is capable of sustaining. It seems that the Superintendent of Buildings in New York is at the present time taking active steps to enforce the law passed in 1871, which declares that "in all storehouses the weight that each floor will safely sustain upon each superficial foot shall be estimated by the owner thereof, and posted in a conspicuous place on each floor thereof." It further provides that the load shall be evenly distributed, and appoints a fine to be collected from owners who disregard this law. Another section of the same law declares

that every floor shall be so built as to be able to bear, in addition to its own weight, seventy-five pounds per square foot, but if it is the floor of an assembly room it must be able to bear one hundred and twenty pounds, and if it is "used as a store, factory, warehouse, or for any other manufacturing or commercial purposes, from 150 to 500 pounds and upwards." The trouble with such laws is that, so far as overloading is concerned, they are very difficult of enforcement; but they are useful in insuring that an owner shall know what it is proper for him to do and give an opportunity, in case of disaster, of bringing the responsibility home to the right person.

Another instance of ignorant overloading is that of a warehouse on Beekman Street, New York, where, on Friday night, May 3, a portion of a basement floor, about thirty feet square, fell into the cellar below. About twenty-six tons of copper and tin in sheets had been brought from a vessel shortly before nightfall, and stored in the warehouse. The floor had often borne heavier weights, and, as it was the intention to rearrange the metal early in the morning, no particular heed was paid to the manner of storing it, so that the greater part of it was placed full in the middle of the floor, where, after an hour, it fell through to the cellar. The weight of the floor and its load at this point seems to have been borne by only two transverse iron beams, which bent under the weight and drew out from the side walls. Moreover, these side walls seem to have been in a very unsafe condition, for the bricks torn away by the fall were of poor quality, and the mortar did not stick to them.

The difficulties which for a long time beset the use of the electric light, and confined it to the functions of a scientific toy, are gradually being overcome, and there is a prospect that it may become a useful commonplace. The success of many experimenters, especially of M. Jablochkoff, has shown what may be done for hotels and factories, and the lighting of the *Place de l'Opéra*, at Paris, has attracted universal attention. One of the chief obstacles heretofore to the convenient use of this light has been the difficulty of economizing the electric current and of subdividing it among a number of lamps which could burn independently. The cost of supplying batteries has been got over by using the induced current of a magneto-electric machine, as is done by Dr. Siemens and others; and latterly Mr. J. B. Fuller, of Brooklyn, is said to have devised a means of subdividing the current so that a great number of lamps can be supplied without interference with each other. He has also invented a form of street lamp which is said to be simple, efficient, and cheap enough for ordinary service, being an adaptation of the device by which the carbon points, laid parallel, are isolated by a slip of glass which melts away as the points burn down. Mr. Fuller claims that with one of his machines he can supply a hundred lamps, placed in a circle of a mile radius, with an expenditure of thirty pounds of coal per hour for steam power in running the magneto-electric machine.

But while the rest of the world is studying the multiplication of lights, Mr. George Magg, of Pittsburgh, has come forward with a project for illuminating that city by three light-houses set upon the hills about it, with "such a flood of light that anywhere in Pittsburgh or Allegheny a pin could be seen if lying on the pavement in the darkest night," — a proposition which has provoked from some unsympathizing newspapers an inquiry analogous to the famous reply: "Who the d—l *wants* to swing a cat?" Most people, we fancy, would have no thanks for the man who seriously undertook to abolish their nights. It is hard enough to find repose in this world as it is, without seeking to absolutely abate the natural distinction between the seasons of labor and of rest. Fortunately there is not much danger that any one would succeed in it. It is the nature of any artificial or secondary illumination, even of moonlight, to offset its light by shadows in which nothing can be seen, and the more brilliant the light, the more impenetrable the shadows, which could only be avoided by a light vast enough, like that of the sun, to fill the general air with luminousness. Unless, then, the light-houses could be set in air directly over the city and made to shed their beams vertically upon it, it would take an inconvenient number of them, we should think, to throw their light into all the streets and alleys of even a rectangular town. There is no knowing, to be sure, how serviceable an atmosphere of smoke may be in diffusing such a light.

The eighth Annual Convention of the American Labor Reform League met in New York last Sunday. Its platform is a very fair indication of what we said a week ago about the connection between the labor agitation and communism. The first resolution says: —

> That since capitalists take life and destroy property to retain their power to steal, the Kearney men, who invoke the halter in California, the Molly Maguires, reported to have killed coal-bosses, and the railway strikers, are lawful belligerents, justly exercising the same rights of defensive warfare applauded in tipping tea into Boston Harbor, in John Brown's march on Harper's Ferry, and in the killing of pro-slavery Southerners by Northern Unionists.

At one with this are protests against payment of the national debt, arguments for female suffrage, for the abolition of marriage and of interest-bearing debts, and for all the lawless desires which are the favorites of radical socialists. We cannot suppose that the workingmen of the country have any interest in this reckless movement, or even that many of them outside of certain great cities know of its existence; nevertheless it shows, like many other things, the persistent effort of the anarchists in the country to get possession of the banner of the workingmen and lead them to the destruction of society, or at least of what gives society its form and security. So far as we know, all the general movements and assemblies held in the name of workingmen throughout the country are under control of people of this sort. Their leaders, mostly people who have been expelled from the orderly communities of Europe by judicial sentence or by natural selection, are cursed with glibness of tongue, and their followers, inaccessible to reason, are open to their eloquence. It is difficult to see what defense in a time of general discontent is to come between the real workingmen and the influence of these men, who plot and persuade in their name, who are the only ones that assume to lead in pursuit of their interests. The incendiary excitement seems to be communicating itself from Chicago to her rival, St. Louis, and to Cincinnati. We read of the arming and drilling of men in these cities with an avowed purpose of extending an armed league through all the cities of the country. The *Army and Navy Journal* recalls the embarrassment of the Government during last summer's riots, and points with alarm to the reduced proportion which our army bears to our population as compared with earlier and more tranquil times, and to the enormously increased range of its duties that comes with an extended territory. But although there are, we may assume, no communists in Congress, there are many there to whom the army gives a convenient opportunity for cutting down expenses, many who are too busy with their little schemes to give attention to the dangers of society, and some who are not afraid to draw their profit from a popular cry that accounts an army solely as an instrument of despotism.

SCHLIEMANN'S MYCENÆ.[1]

II.

In our first notice of this book (*American Architect*, No. 119) we gave some account of the chief points of architectural interest in it, and of the finding of the circular Agora, within which were afterwards discovered tombs filled with splendid treasures. It remains for us to make such mention as we can of the tombs and their contents.

The sepulchres were rectangular pits of considerable size, sunk some way into the solid rock. They were carefully lined for two or three feet from the bottom, and sometimes more, with walls of stone. The bottoms were strewn with a layer of pebbles, and on these lay bodies half consumed, some more, some less, in a stratum of wood-ashes, and heaped with a profusion of ornaments and valuables. Over the bodies was spread a layer of white clay, and over this a second layer of pebbles, above which the earth was filled in. Three of the sepulchres contained each three bodies or skeletons; one contained five, and one a single body. The three skeletons found in one of the tombs were of women, the rest of men. All the bodies lay with their heads to the east, with the notable exception that in the largest tomb three were in this position and two lay north and south. They had evidently been burned where they were found, as was shown by the blackening of the pebbles beneath them and the walls around, as well as by the ashes; the gold ornaments about them

[1] Mycenæ: A Narrative of Researches and Discoveries at Mycenæ and Tiryns. By Dr. Henry Schliemann, citizen of the United States of America. Author of "Troy and its Remains," "Ithaque, le Péloponnèse, et Troie," and "La Chine et le Japon." The Preface by the Right Hon. W. E. Gladstone, M. P. Maps, Plans, and other Illustrations, representing more than 500 types of the objects found in the Royal Sepulchres of Mycenæ and elsewhere in the Excavations. New York: Scribner, Armstrong & Co. 1878

also showed the marks of fire. There was every indication that in each tomb the bodies had been burned and buried simultaneously. One of the sepulchres was narrowed by the lining walls to five feet six inches in width, and the bodies which lay across it had been put in a sitting or perhaps half reclining posture. The body of one of them, an unusually large man, was wonderfully preserved in texture, but absolutely crushed to the thinness of a plank, and his head crowded into his chest, by the tremendous pressure of the twenty or thirty feet of earth and stones which had weighed on him for thousands of years. Dr. Schliemann had a painting made of the body, lest it should crumble before it could be moved; but after being cleverly injected, or embalmed, by a druggist, with a solution of gum sandarac in alcohol, it was carried to Athens in safety.

It is Dr. Schliemann's opinion that the layer of pebbles beneath the bodies was put there to give ventilation to the fires upon it; but it is difficult to see how it could do this at the bottom of a pit, and perhaps the fact that the pebbles made a clean substratum for the funeral piles, and a covering for the bodies, is explanation enough of their being there, both above and below. One may venture to guess that the layer of clay was used for disinfection, being impervious, when we consider the half burnt condition of the bodies. Experience has shown us that even in these days of blast furnaces and retorts, complete cremation is not easily accomplished, and we might suspect that in the heroic ages it was not looked for — out of poetry — which is perhaps in itself sufficient reason for a custom of burning bodies in the pits that were to be their sepulchres.

There is good reason to doubt, we think, whether the tombstones which were found several feet above the sepulchres were contemporaneous with the burial, and we do not understand that Dr. Schliemann assumes them to have been so. They seem to have been placed without any very exact reference to the position of the tombs below, except the round structure which he calls an altar, and which he distinctly says was over the centre of one tomb. It looks rather as if they might have been set by some later generation to mark the spots which pious tradition assigned as the resting-places of venerated ancestors, from which the original memorials had disappeared through violence or accident. At any rate the workmanship of them, though analogous in style, as would be natural, is so out of keeping with that of the objects found in the tombs, and so inferior, that it is difficult to believe that the people who could command the one would be satisfied with the other. But to this we may have occasion to recur.

We will not follow Dr. Schliemann through the many reasons by which he supports his foregone conviction — which is apparently accepted, but more cautiously, by Mr. Gladstone — that these were the tombs and bodies of the murdered Agamemnon and his companions. He lays chief stress on there being five tombs, as Pausanias had said; on the somewhat irreconcilable postulates that the bodies were buried in royal splendor, and yet crammed into their sepulchres with unseemly haste and violence; and that the identical manner of the interments shows them to have been all simultaneous. A few suggestions, however, occur to the reader of the book, which it is natural to mention. The sepulchres are indeed five, and doubtless were in Pausanias's time. But the bodies are fifteen, which are more than the Homeric legends provide for, to say nothing of bodies found buried outside the royal tombs. The arrangement of the tombs does not look as if they were laid out together. They are jumbled in the Agora like graves in a country churchyard, sometimes almost interfering, as if they had been put in successively wherever room was found. They are not excavated uniformly, but are capriciously irregular in depth and level as well as in position. One of them is lined with a straight wall of large stones laid dry; others with a sloping or battered wall of irregular rubble laid in white clay; one has a lining of inclined slabs jointed with clay, and another a sloping wall faced with similar slabs. All these irregularities suggest a successive rather than a simultaneous construction. On the other hand, the way in which the bodies are sorted out in threes, the women together, may suggest an opportunity for distribution that would not have occurred unless a large number of bodies had been buried at the same time. But this arrangement again encourages the idea of some peculiar rites of burial; a habit, for instance, of burying a royal person of either sex with two faithful attendants, whom the casualties of war might commonly make ready, or who might even be immolated for the occasion. There are, as we have indicated, two marked exceptions to such an arrangement, — the tomb with a single body and that with five, — exceptions which may or may not indicate a difference in the habit or preference of successive generations. It is noticeable that the sepulchres are distinctly proportioned in size to the number of bodies they contained, showing that they were deliberately adapted to their use; and it is a matter of regret that Dr. Schliemann does not tell us whether he detected any such differences in the condition in which the adjacent bodies lay as might indicate a superiority of richer personage. This was to be looked for especially in the large tomb where two of the five bodies lay with their heads in a different direction from all the other thirteen. It was evidently a matter of feeling or rite, and not of convenience; for anybody who will take the trouble to draw a diagram, to scale, of the plan of this sepulchre, which was eighteen by ten and one half feet on the floor inside the lining walls, its length being north and south, will see that there are only two ways in which five bodies might have been conveniently arranged in it. The natural way was to lay all side by side across the floor, the axes of the bodies being east and west, as was the case with all the other bodies in all the tombs. The other way, which is according to Dr. Schliemann's account, and which would not have been adopted without a distinct reason, was to turn two of the bodies at right angles to the rest and make them lie north and south, as if to class them apart, probably as a mark of inferior rank. We do not find, however, in the accounts of the book, any evidence of a difference of estate, except perhaps in the fact that one of the women wore an enriched crown and the others simpler diadems; and, it may be, some slight indication in the form of the masks they wore that the two bodies which lay across the direction of the others were those of younger men.

As for Dr. Schliemann's theory of haste and indignity in the burial, the facts which he cites seem to tell directly against it. The laborious hewing of sepulchres in the solid rock, the careful lining with stones laid in clay for mortar, and in some cases the facing of these stones with smooth slabs, the regular disposition of the bodies, and the way in which they were heaped with all manner of precious articles, all seem directly opposed to it. The thing in which he puts most reliance is the way in which the body we have mentioned as found crushed had been, as he thinks, violently thrust into a grave that was too small for it, so as to force its head down upon its breast; but who can say, from the appearance of a body which has been loaded for centuries with tons of earth and stones, whether it was first crowded rudely into its place or seated reverently with its back to the wall, as it has been the habit of many peoples to seat their dead?

We cannot attempt a detailed account of the smaller objects which Dr. Schliemann found in the tombs and during his excavations. Our readers may see them illustrated in the book itself, which we trust they have read or will read, and have found descriptions of them in many notices of the discoveries in newspapers and magazines. The records of actual exploration have shown nothing comparable to them in romantic interest; we have to turn to the discoveries of Aladdin for a parallel to their splendors, which have dazzled the public as their age and relationship have puzzled the archæologists. In the *débris* which encumbered the Agora, as well as at Tiryns, and indeed everywhere, Dr. Schliemann found abundance of fragments of pottery; in the upper strata, as he says, of the Macedonian epoch, and lower down, shards and vessels of more archaic times, both hand-made and wheel-made. There were none or almost none of the so-called whorls, such as were found at Hissarlik; but a great store of rude animals in terra cotta and an immense number of shapeless little figures which he calls idols. A theory which he holds of the meaning of Homer's *βοῶπις*, which he translates "cowheaded," leads Dr. Schliemann to call all his animals cows and all his figures cowheaded Junos, a theory into which we shall not venture to follow him. Beads of glass and stones were found, gems cut in intaglio, some of them with very considerable skill, axes and arrowheads, both of stone and of bronze, bronze swords in great numbers, rings and various ornaments, but nothing of iron, except one or two knives and keys in comparatively recent strata. The absence of iron might be accounted for by its perishable nature, were it not that several carved objects of still more perishable material, bone and wood, were found in fair preservation at the very bottoms of the sepulchres.

The details of the burial of these bodies are interesting as a chapter of archæological study, but do not as yet lend much assistance to the classification of the Mycenæan antiquities, for want of examples for comparison. The position of the bodies,

with their heads toward the east, is a common usage in the burials of early and primitive races. Certain analogies in the modes of burial, as well as in the workmanship of the ornaments found with the bodies, have led Mr. A. S. Murray, of the British Museum, to suggest that Dr. Schliemann may have discovered only Germanic remains, — a scepticism in which we believe few authorities agree. It is to the objects found in and near the sepulchres, the pottery and metal work, that the study of archæologists will be chiefly directed, and here there is room for much comparison before their classification can be fairly established. The pottery is of a kind which does not find a place in any chronological system thus far determined, and Mr. Murray is inclined to allow it no earlier date than the sixth century B. C. It bears, however, striking analogies to that recently discovered at Ialysus and Camirus in Rhodes, at Santorin, and in Cyprus; and it will not be till all these have been thoroughly studied and some classification of them fixed, that its place can be determined. The goldsmith's work offers, by its profusion and the curious characteristics of its design and execution, the most attractive subject for examination; and without attempting to disentangle the intricacies of archæological research, we shall try to give some account of it in a third article.

HEAT AND VENTILATION. II.

[*See page 165, ante.*]

But to return to our main point, the necessity of supplying purified and mildly temperatured air to all our fellow-citizens. Is it not somewhat remarkable that human beings should by the mere power of habit come to love what they have loathed? And yet they do so. They actually defend the perpetuation of the air-poisoning to which I have referred, and which is one of the effects of the combustion of the fourteen ounces of carbon that De Liebig says are burned daily within the body. The share of impurity of the air thus contributed by each living furnace has been variously estimated. "From experiments with men of different stature," says the eminent English engineer, Dr. Berman, "Menzies found that from fourteen to eighteen respirations were made in a minute; and others have found they vary from thirteen to twenty-two; the average generally assumed is twenty respirations in a minute. The quantity of air drawn into the lungs at each respiration varied from 40.7 to 46.7 cubic inches; and under all the circumstances, Menzies considered 720 cubic inches about the average quantity of air inhaled by a healthy man in a minute. A woman may inspire, on an average, about five hundred cubic inches; a mean inspiration from a healthy pair of the species will not, probably, exceed 612 cubic inches in a minute.

"The fresh air before it is taken into the lungs is composed of 23.2 per cent of oxygen, 75.5 per cent of nitrogen, about 1½ per cent of carbonic acid, and a variable quantity of vapor of water. After it has been expired from the lungs, in which it remains from ten to twelve seconds, it contains a larger quantity of vapor, the same quantity of nitrogen, from 11 to 12 per cent only of oxygen, and between 8 and 9 per cent of carbonic acid; so that nearly a half of the oxygen or vital element of the air has been changed into carbonic acid. If atmospheric air contains merely 3.6 per cent of this gas, it is unfit to support animal life. Air, therefore, which has been expired from the lungs contains twenty-four times this quantity; so that a person who inhales 600 cubic inches a minute renders 1400 cubic inches unfit to be breathed again.

"The amount of exhalation from the skin varies also in different individuals, and from the same person at different times. A hand emitted ½ of a grain in a minute, at another trial ½ of a grain, and in a third experiment it exhaled ¾ of a grain of vapor in a minute; which is 45 grains a minute for the whole body. If one of each sex be taken, the mean will be about 23 grains each in a minute."

We must not suppose, however, that these air-poisonings through the exhalation of our bodies have been observed only in modern times. The architectural remains left us by the ancients clearly testify to a thorough knowledge of the evil and to the endless strife to overcome it; and even their garments were varied, like our own, according to the temperature, day, or season. People must have an outlet for the carbonized air of their bodies, in their dwellings, and an inlet for new heat-impregnated pure air. The Esquimaux gets his warmth from the train-oil and his powerful ventilation from his snow hut; while the French lace-makers, who work only during the night, produce an artificial climate by getting some farmer to allow them the privilege of working in the stable where his cows are tethered. "The cows are tethered in a row, on one side of the apartment, and the lace-makers sit cross-legged on the ground on the other side, with their feet buried in straw. The cattle being out afield by day, the women work all night; and numbers of young men of their own rank resort to these cow-houses, and sit or lie down on the straw beside their sweethearts, and sing, tell stories, and say soft things to cheer them in their labors."[1]

So in primitive days, as well as at present amongst primitive people, heat was unconsciously sought for by men as the effective means of ventilating their bodies. For those exhalations of our bodies are carried from the body by diluting them with atmospheric air, which at a certain temperature can hold in suspension only a certain quantity of vapor, the amount of which is shown in the following table,[2] the first column giving the temperature of the air, and the second column the number of grains of water a cubic foot of it will contain, in the form of vapor, at that temperature.

Temperature.	Grains of Water in a Cubic Foot of Air.	Temperature.	Grains of Water in a Cubic Foot of Air.
32 degrees.	2.58	62 degrees.	6.57
33 degrees.	2.63	63 degrees.	6.79
34 degrees.	2.71	64 degrees.	7.01
35 degrees.	2.80	65 degrees.	7.23
36 degrees.	2.89	66 degrees.	7.44
37 degrees.	2.97	67 degrees.	7.66
38 degrees.	3.06	68 degrees.	7.89
39 degrees.	3.15	69 degrees.	8.13
40 degrees.	3.23	70 degrees.	8.38
41 degrees.	3.37	71 degrees.	8.65
42 degrees.	3.50	72 degrees.	8.92
43 degrees.	3.63	73 degrees.	9.19
44 degrees.	3.76	74 degrees.	9.46
45 degrees.	3.89	75 degrees.	9.73
46 degrees.	4.02	76 degrees.	10.10
47 degrees.	4.15	77 degrees.	10.38
48 degrees.	4.27	78 degrees.	10.69
49 degrees.	4.40	79 degrees.	11.01
50 degrees.	4.53	80 degrees.	11.33
51 degrees.	4.68	81 degrees.	11.66
52 degrees.	4.83	82 degrees.	12.05
53 degrees.	5.02	83 degrees.	12.45
54 degrees.	5.17	84 degrees.	12.71
55 degrees.	5.34	85 degrees.	13.08
56 degrees.	5.51	86 degrees.	13.45
57 degrees.	5.67	87 degrees.	13.87
58 degrees.	5.86	88 degrees.	14.23
59 degrees.	6.04	89 degrees.	14.61
60 degrees.	6.22	90 degrees.	15.00
61 degrees.	6.39		

According to the table a cubic foot of air at the freezing point can retain 2.58 grains of water only; if, therefore, it contains 1 grain only, then each cubic foot will absorb or carry off 1.58 grains of vapor from a moist surface, which may be the insensible perspiration from the surface of the body. If this air be heated to 60°, a cubic foot of it will carry off 5.22 grains of moisture from the skin; for it is seen from the table that air at 60° can suspend 6.22 grains of water. To carry off 23 grains of insensible perspiration per minute will therefore require about 16 cubic feet of the colder air, and about 44 cubic feet of the warmer air. If less than this be supplied, the moisture will accumulate on the skin, and the air of the room become saturated with vapor. And this moisture will be still further increased by the air entering the house through the windows. It has been ascertained that each square foot of glass in a window will cool about one cubic foot of air as many degrees per minute as the temperature of the room exceeds the temperature of the external air. If a window has 6 square feet of glass, and the temperature out of doors be 32° and in the room 60°, then 5 cubic feet of air will be cooled 28° in a minute. Of the quantity of cold air admitted at the crevices round the window-sashes and round the door no definite estimate can be given; it depends on the position of the window above the floor, on its fitting, on the difference of temperature between the room and the air outside, on the force of the wind, and other causes. If three times the width of the sash, added to twice its height, be multiplied by three, it will give about the number of cubic feet of air cooled from this cause. The crevices round the sashes of a window 4 feet wide and 8 feet high will cool about 8.5 cubic feet in a minute. Twice the width, added to the height of a door, multiplied by 26, will give the cubic feet of air cooled per minute for that opening. When well made, a door 3 feet wide and 7 feet high will cool about 5.2 feet in a minute.

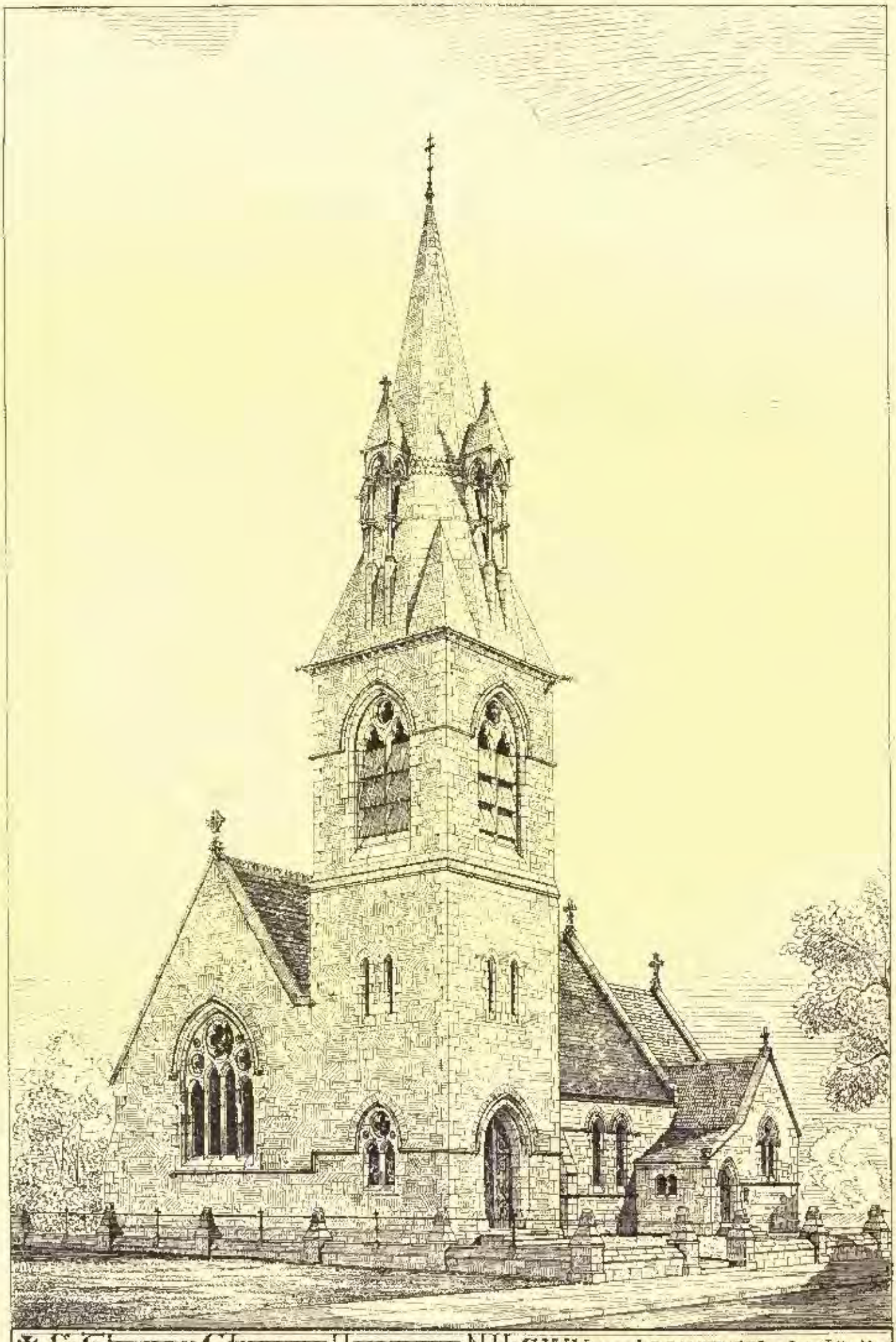
The absorption and radiation of heat from every 200 square feet of the wall, ceiling, and floor may be taken on an average as equal to cooling one cubic foot of air per minute as many degrees as the internal is warmer than the external air.

In fixing the quantity of heating surface to produce this effect, some other points have to be considered. The wind, for instance, greatly accelerates the cooling of the walls and windows in any state of the air. The air being moister at one period than another, its power to carry off heat is much increased; and there are also great changes of temperature. So that if a steam-pipe or a hot surface were sufficient to heat a certain sized building at one time, it might prove insufficient when the air was at the same temperature but windy, or when it was moist, or when the temperature fell.

As the hot water, steam, or hot air apparatus cannot be enlarged, nor its temperature raised beyond a certain point, and as it must be proportioned to meet the greatest degree of cold that is likely to occur, the usual way to make an allowance for these contingencies in practice is to calculate the quantity of surface that would be required to heat the building, if the outside air were at the lowest degree to which it had ever fallen in the place where the apparatus is erected.

[1] St. John, Journal of Residence in Normandy.

[2] Daniel, Meteorological Essays, p. 158.



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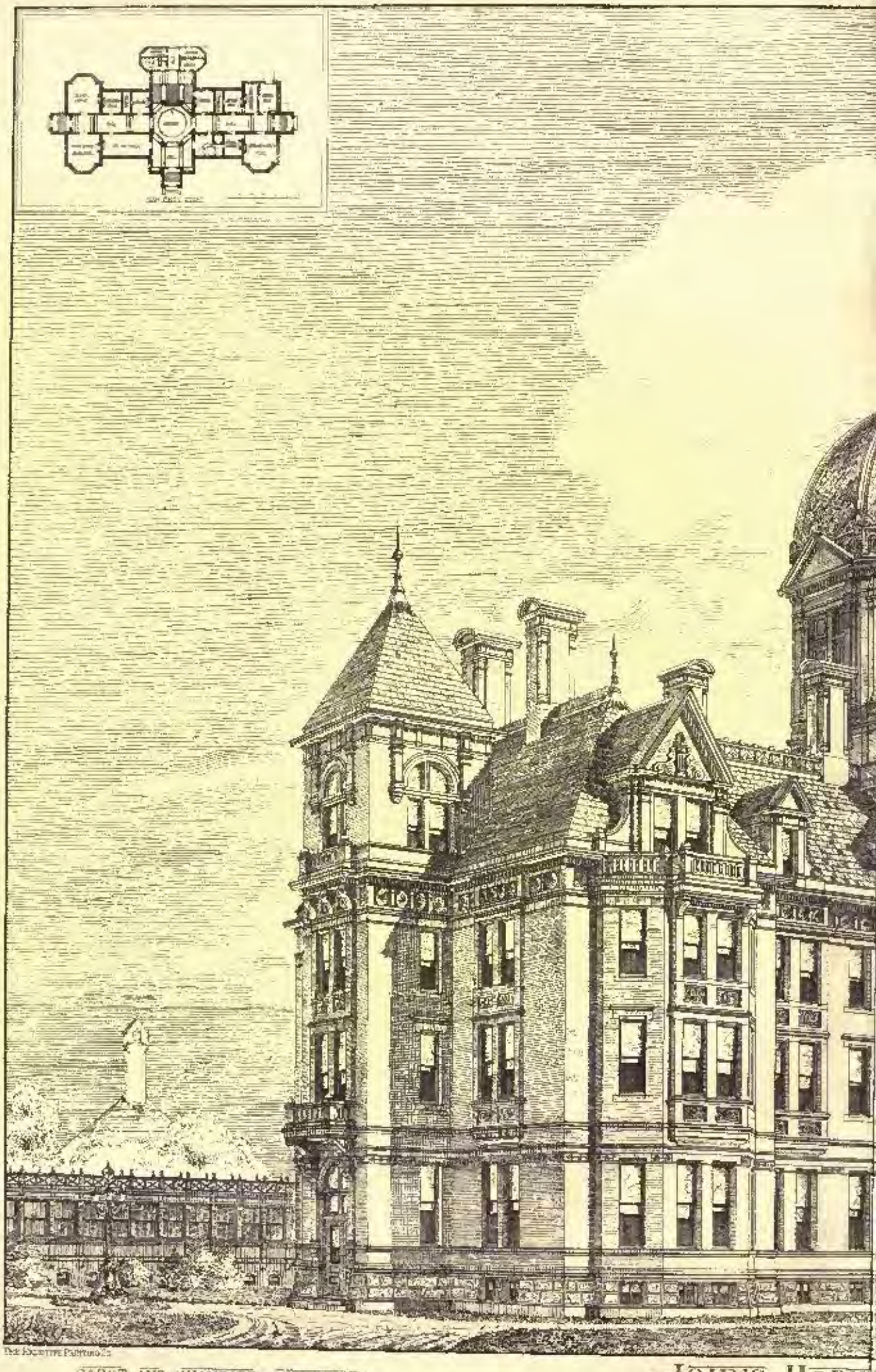

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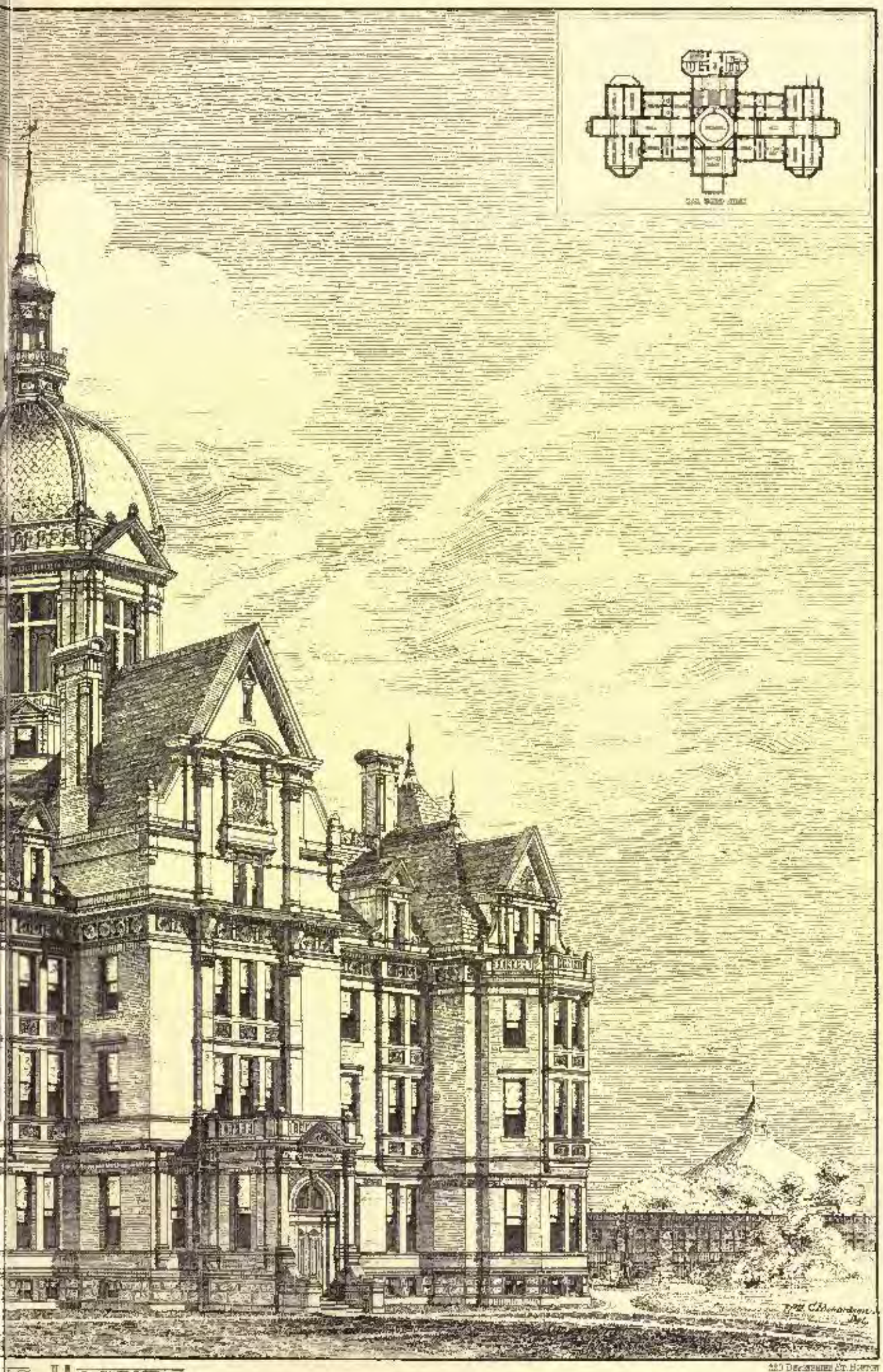

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R. HUDSON HOLLY, ARCHITECT

In estimating the quantity of steam or hot water pipe that should be placed in the room described, to allow 161.8 feet to be heated in a minute, the statement would be thus: external air at zero, temperature of room 64°, pipe-surface 200°, then by the rule $125 \times 64 \div 136 \times 157\frac{1}{4} \div 232 = 41.1$ feet of 4-inch pipe which would be required.

The quantity of air to be heated being determined, the size of the aperture for the egress of the vitiated air may be found in the following way: —

Temperature.	Bulk.
32 degrees	1.000
212 degrees	1.375
302 degrees	1.5576
392 degrees	1.7389
482 degrees	1.9189
572 degrees	2.0976
680 degrees	2.3138

In a room 16 feet between the floor and ceiling, when its temperature is 64° and the air outside is 32°, the warm air will flow through an aperture in the ceiling with a velocity of 7.8 feet in a second; if the number of cubic feet of air required for ventilation in a second be divided by the velocity thus found, it will give the area in square feet of the aperture required. In the above example, as 1619 cubic feet are to be removed in a minute, the ventilator must have an area of about 48.2 square inches. This also may be the size of the opening to admit the cold air; but in practice it is made considerably larger, to diminish the velocity of the air at entering the room.[1]

I have said that the art of ventilation and regulating the temperature of a dwelling or city was well known to the ancients. They applied it in its two most important forms of the sewer and the chimney, and perfected it to a comparatively rare degree; but with the great invasion of the Asiatic barbarians over Europe this art perished with all other arts and sciences, nor did it revive until the twelfth and thirteenth centuries, when the Minnesinger created a new poetry, when the gigantic conceptions of the Strassburg and Cologne cathedrals were being wrought out, and the science of law received new form fitted to modern circumstances, under the direction of Frederic II. of Hohenstauffen, — the second emperor of the Old German Empire, whose Code may well compare with that of Justinian or that of Napoleon, as he was perhaps their equal in statesmanship and the art of war.

Indeed, the bodily refinement which followed the culture excited by the crusades and the consequent revival of all ancient art, literature, and learning could not long endure contentedly the nauseating effluvia of unventilated rooms and undrained houses. Rigord, the physician of Philip Augustus, the King of France, at the close of the twelfth century, relates that one day the king, after walking to and fro in the audience chamber of his Parisian "palace," went to look out on the river for recreation; some citizens happened to pass at the moment under the window where the king had placed himself, when the substance forming the street, being stirred up by the revolution of the wheels, exhaled a stench so intolerable as to overpower Philip. Urged by the disgust thus excited, the king exerted himself to persuade the citizens to pave their streets with stone, he himself being rather lacking of cash; and to perfect still further the works of purification and prevent the future desecration of the cathedral, through its remaining a common corner of convenience, his piety and zeal for decency incited him to surround the sacred edifice with a wall, by which means, his biographer observes, he so improved his capital, that from being called Lutetia *(quia a luti fœtore)* or "Mud city," on account of its dirtiness, it was henceforth named Paris, after the beautiful son of King Priam.

After the advantages of drainage and purifying the air had thus been detected and some of the means discovered by which these results could be more permanently established, such as making the streets solid and with gutters, men suddenly discovered a treasure in the earth, which for centuries had been lying there in its black ugliness, until a Promethean spark made it burst forth upon the astonished people as not only a giver of wondrous light, but also a dispenser of the most gracious and easiest attainable warmth. About the end of the twelfth century a notice of coal appears as an article of traffic and as a staple element in the social comfort of Great Britain. In the *Leges Burgorum*, enacted at Newcastle about 1140, the especial privilege of not being distrained but for their own debts is granted in Scotland to the inbringers of fuel, which is described to be "wood, turfs, and peats." With respect to coal there is a complete silence, from which it has been somewhat hastily concluded, that, though coal must have been known, it was not used as fuel. The first legal notice of this mineral is in a grant, made in the reign of William the Lion, by William de Vescy-ponte, to the monks of Holywood, of a "tenth of his coal at Carriden," and in the Chartulary of Newbottle, there is in 1189 a grant to the monks by De Quincy, Constable of Scotland, of the coal between Whiteside and Penkie, which is also confirmed by King William.

In 1239, Henry III. granted a charter to the inhabitants of Newcastle to dig for coal, which is the first legal mention of the fuel in England. Its properties and value must, however, have been long known in this locality before the privilege to dig for it was thought worth a payment of one hundred pounds a year. The use of the mineral seems to have rapidly increased, for in 1281 Newcastle is said to have had a considerable trade in it; and about the end of the century, coal was imported into London for the use of brewers, dyers, smiths, and others. So strong, however, was the prejudice of the citizens against its use, from a belief that its fumes corrupted the air and were most injurious to health, that in 1306 Parliament petitioned the king to prohibit the burning of the noxious fuel within the city. The royal proclamation having failed to abate the growing nuisance, a commission was appointed to ascertain who burned coal within the city and in its neighborhood, and to punish them by fine for the first offence and by demolition of their furnaces; and if they persisted in transgression, more rigorous measures were to be resorted to. Subsequently a law passed making it a capital offence to burn coal within the city, and only permitting it to be used in forges in the neighborhood. Among the records in the Tower, Mr. Astle found a document stating that in the time of Edward I. a man was tried, convicted, and executed for the crime of burning coal in London. Yet it is difficult to reconcile this extreme rigor with a claim made to Parliament for the sum of ten shillings for pit coals that had been ordered, but not paid for, by the clerk of the palace, and were burned at the king's coronation, which took place a few years afterwards. Shortly after this, coal was exported; and in 1325, a vessel, the property of Thomas Rente, of Pontoise (a town at that time belonging to England), trading to Newcastle, returned with a cargo of pit coal. It is probable that at this time it was a marketable article in the place of importation. In all likelihood the trade had increased, for in 1327 the measure of coal became an object of municipal regulation; in Scotland, also, its use was gaining ground; in 1329 a chaldron of coal appears charged to the Scots Parliament. It had become a common article of traffic when Sir William Douglass and Sir Simon Fraser, a few years afterwards, surprised the English garrison in Edinburgh Castle. He and his party, according to the chronicler, went to sea, and purchased oats, oatmeal, *coal*, and straw, and landed at a port about three miles from the stronghold; they loaded twelve horses with these articles, and disguising themselves "in old thread-bare clothes with torn hats like poor tradesmen," they proceeded to the castle and offered their merchandise for sale. When admitted by the porter within the first gate, they flung off the loads of two horses, which consisted of coal, directly upon the sill of the gate, so that it could not be shut, and then seized the porter, whom they murdered instantly, and placing the remainder of the coal also within the gates, so that they could not be closed, "the dire coal merchants introduced their companions within the castle."

Together with the discovery of coal as the most excellent material for heating purposes, came the application of glass windows to houses, to the marvellous effects of which as an agent in the process of ventilation we have already referred. At a future time and occasion we may perhaps expound more at length another of its wonderful powers, to which Mr. Shove has given special attention in the book alluded to at the beginning of this essay. Meanwhile we propose to set apart hygiene as a part of the science of architecture.

[1] Walker Barnan on Warming and Ventilating Rooms and Houses.

THE ILLUSTRATIONS.

JOHNS HOPKINS HOSPITAL, BALTIMORE, MD. MESSRS. CABOT AND CHANDLER, ARCHITECTS, BOSTON; MR. JOHN R. NIERNSEE, CONSULTING ARCHITECT, BALTIMORE.

This scheme contemplates twenty or more buildings, which will occupy fourteen acres of land crowning one of the hills upon which Baltimore is built. The perspective shows the Administration Building, which will be built of Baltimore face brick and Cheat River stone, a fine-grained blue stone; the decoration to be of terra cotta of the same color as the brick. The very responsible position of superintendent of construction is held by Mr. John E. Marshall, one of the most experienced builders of Baltimore.

ST. THOMAS'S CHURCH, HANOVER, N. H. MR. FREDERICK C. WITHERS, ARCHITECT, NEW YORK.

The foundations of this church were laid in 1873, and the nave was built in the following year. The funds were raised by subscription. In 1876 the chancel and robing-room were added, at the expense of Mrs. C. A. Harris, of New York, in memory of an only child. The view herewith given shows the church complete with the tower, which is to be built at some future time. The walls are constructed of local granite laid in random courses of small stones with rock face, the heads and beds being squared. The finish is of New Brunswick stone. The timbers of the nave roof are exposed to view, the trusses being constructed with hammer-beams and curved braces resting on moulded stone corbels. The chancel ceiling is boarded under the roof timbers, which are arched, and divided into panels by moulded ribs. The east window is filled with stained glass, made by Daniel Bell, of London; the subjects are the Birth, Crucifixion, and Resurrection of our Lord, in the three lights, and the Ascension, in the large circle in the head. There is accommodation for about three hundred worshippers.

ST. LUKE'S MEMORIAL HALL, UNIVERSITY OF THE SOUTH, TENN. MR. E. HUDSON HOLLY, ARCHITECT.

CLEOPATRA'S NEEDLE. — The salvors of the Cleopatra obelisk have been awarded $10,000 and costs.

SIR GILBERT SCOTT.

He was, so to speak, the artist of reason. He first cleared his own mind as to what he wanted, and he then worked up to that result with the precision of a mathematician solving a problem. He was not only the typical architect of a school and age, but he was to that age the administrator of the principles which the school existed to teach. With him the poet never absorbed the philosopher, although the philosophy which he wooed was that of constructive rhythm. This peculiarity of temperament manifested itself in some well-defined idiosyncrasies. Those who have made a consecutive study of his works will have noticed some successive "manners" in them. He was at first strongly and exclusively English,—and to the last his allegiance to specific English architecture was always true and loyal,—but very naturally those studies in German architecture which the Hamburg commission necessitated had for a time their influence on his style. Later in life he passed under the fascination of Italian Gothic, and, although he never yielded to it so complacently as some younger men, traces of Southern taste continued to adhere to his works. He there realized the value of a richer variety of material in marbles, terra cotta, etc., than mediæval England pointed to. Both Germany and Italy had taught him the value of brick. From Italy, too, we believe, he brought back a certain flavor of *rotundness*, graceful more than strong, in his pillars and windows, which it is impossible accurately to describe in words, but which, more than any other peculiarity, marks off his designs. In Italy, especially, he learned to appreciate the undeveloped value to Gothic art of the dome, as yet reckoned in the vulgar estimation as the badge of the other side; and we fancy that he never felt a greater artistic disappointment than that of having failed of the opportunity to give material expression to the conviction. On the other hand, the occasion which the Albert Memorial, coupled with the Albert Chapel at Windsor, offered to him of experimenting, in concert with brother artists, on fresh materials and combinations,—glass mosaic, for instance, and metal work on a large scale and for external use,—in addition to the compliment involved in his being selected for those commissions, made the work one of peculiar importance in his eyes. It was no doubt the result of his cautious forethought that, although he was as anxious as any other architect of his party about the decorative accessories of his buildings, and although, as founder and foster-father of the Architectural Museum, he took a more self-denying interest in the art-workman movement than other men, he never was tempted like some of his brethren to be his own designer of artistic accessories. He ordered and he superintended his painted glass, his roof and wall polychrome, his apparatus in the precious metals, his hangings and embroideries; but he never furnished the absolute design, as Pugin did, and as some very eminent architects are still accustomed to do. He was indeed his own designer in woodwork, in pavements, and in the various combinations of iron and brass,—making the sculptured reredos and the choir screen his specialty; but the bulk and the value to the structure of the products of these materials bring them within the legitimate sphere of the absolute architect's studies.

There have been, we suppose, few men of whose personal character the popular idea, founded on inferences derived from the multiplicity of the works which he carried through, is more erroneous than of Sir Gilbert Scott. He has been popularly looked upon as the great master manufacturer who boasts of turning out his products wholesale —

> Dirutt, mittitat, mutat quadrata rotundis —

by telegram or mandate to his obsequious cohort of clerks, without much more personal feeling for the individuality of each article than the mill owner can be credited with for each successive bale of stuff. The real man was, with all his accumulation of work, genuinely modest, sensitive, anxious, and painstaking, and even self-tormenting over results which had cost him infinite time and thought. We do not hesitate to say that we think that Sir Gilbert Scott might with much advantage have retrenched his area of operations, nor can we deny that their number and variety involved the repeated risk of things being done which had not passed under the master's eye. But when once his attention was drawn to any such mishap, the genuine and conscientious earnestness of the man came into play. He was undoubtedly at his constructive best where the building was conspicuous; grandeur, bulk, intricacy of plan, and a public destination stimulated his inventive qualities, while he had but a subaltern interest in the small and the simple. But there was even a better side than his constructive one in his ethical nature, when he seemed to assume a double individuality and take himself into counsel so as to place his powers as an architect at the service of the patient intuitiveness which marked his archæological character. To unriddle and to revive an old building gave him all an antiquary's genuine pleasure; and if that building were one of the importance and grandeur of St. Albans, Ely, St. David's, or one possessing so strange an architectural history as Bangor Cathedral, his enjoyment became perfectly enthusiastic. We need only point to the anxious and daring work of engineering now in progress to save the fabric of St. Albans. He was the first himself to own that in the earlier days of the restoration era he was, like all his compeers, too exclusively possessed with that artistic partisanship which grasped the idea of a perfect epoch, and was too lightly willing to sacrifice, as a real loss of historical association, that which stood in the way of its symmetrical revival. But every year saw Scott more conservative, more anxiously painstaking, more appreciative of historical association and of the picturesque grouping of forms, not very noble in themselves, but valuable as elements of contrast. It was accordingly with a genuine grief of heart and a self-diffidence against which his antecedents and assured position ought to have fortified him, that Sir Gilbert Scott met the rough and inconsiderate assaults which have been recently made upon the practice both of himself and of his school by that knot of critics who have so oddly exalted Queen Anne into the patron saint of anti-restoration. He replied to them in an admirable spirit of candor, confessing to his blunders and the experiences which had been the schooling of himself and of his contemporaries, and relying on his fairness to demonstrate the injustice of a charge of which the basis was a misrepresentation of his motives. But when he had done this he seemed to be more hurt at the imputation of Vandalism than elated at the completeness of his vindication.—*Saturday Review.*

CORRESPONDENCE.

A CATHOLIC SCHOOL-HOUSE,—THE WINDSOR TOWN HALL.—THE CAPITOL.—TRINITY COLLEGE LABORATORIES.

HARTFORD, CONN.

A Catholic school is now building from plans by Messrs. Brown and Stilson, of New Haven. The school will be built by the parish of St. Joseph, now building the cathedral mentioned in a former letter. The site of the school will be at no great distance from the new state capitol on Capitol Avenue; the lot is a corner lot; already the ground has been broken and excavations begun. The building will have a frontage of 100 feet, with projecting bays on either side, and will be 74 feet 4 inches in depth. The façade will be marked by two bold projections 24 feet wide, carried up and finished with gables, and an intervening curtain wall pierced at each story by a series of six narrow windows. The building will be three stories high, exclusive of the basement. On the front of the building, in each L, will be the entrances, one for girls and one for boys, the hall-ways occupying the entire length of the L and also having entrances on the rear. The material used in the construction of the building will be red brick and Portland brown stone, which will be used for the foundations, caps, and sills throughout, for the walls to the height of the water-table, and for the entrance steps. The comparative plainness of the structure will be relieved by string courses and elaborate bands of ornamental brickwork, which are carried entirely around the building. The gables show brickwork corbeled out on either side of the stone coping, and the wall face of the gables at the intersection of the coping lines is enriched with ornamental brickwork, while in the curtain wall of the principal façade diaper brickwork will be shown above the series of square-headed windows, these and other instances of the use of brick, showing studied design, are seen in the principal cornices and in the chimneys.

The ground floor plan provides six school-rooms, three for girls and three for boys. The rooms for the girls occupy the projecting portions of the building on the left, and a front room in the central part of the structure, the corresponding apartments affording school-rooms for boys. Near the rear entrance, and beneath the principal flight of stairs, are the steps leading to the basement. This will have a cemented floor, and being amply lighted will give space for play-rooms. Intersecting the main entrance hall on the ground-floor is a broad passage, from which doors open to the school-rooms. Each of the six school rooms is planned for the accommodation of sixty-four pupils. The rooms are well ventilated, the chimneys being provided with all the necessary flues and ducts. The first floor is arranged similarly to the ground-floor, the building thus furnishing twelve school-rooms in all. The second floor gives a large hall with two convenient anterooms. The roof upon the central part of the school is carried up higher than the adjoining ridges, and is crowned by a bell tower with pyramidal-shaped roof having extending eaves. The building throughout will be plainly finished in ash. At this writing the contracts have not been awarded, but approximate estimates place the cost of the structure in the neighborhood of $20,000. It is proposed to prosecute the work steadily when once begun, with a view to the occupancy of the school early in the fall.

Mr. S. W. Lincoln, architect, has in hand the plans for a town hall to be built at Windsor, a few miles north of Hartford. The materials used are brick, set off with bands and courses of black brick, and brown stone for window caps, sills, etc. Exteriorly the hall measures 50 by 78 feet, the front being broken by a tower whose walls are carried up to a height of 80 feet and are pierced at their upper portion by windows with louvre openings. The building is two stories high, exclusive of the basement: the principal floor supplies offices for the town authorities, and the floor above provides a hall with galleries. The finish will be plain in design. The cost of the entire work will not exceed $7,000.

About the time of the recent occupancy of the state house by the Connecticut legislature, work was resumed upon the dome of the building, which is now being pushed forward, or rather upward, at a rapid rate. Some modifications and changes have been made of late in the design of this prominent feature. From the line of the main roofs to the bottom of the cone the dome is dodecagonal in form, and above the cone is a lantern upholding the pedestal for the crowning bronze figure. The lantern originally presented a series of twelve gablets supported by lofty columns; the number has now been reduced, the gablets numbering but four, with eight supporting columns,

three miniature columns beneath each gablet being worked into the composition. The whole study is an improvement on the original, and shows more clever handling of details. Already the dome has risen about 80 feet above the principal roof lines, and displays much boldly executed work.

The praise which has been bestowed upon the arrangements and appointments of the rooms for the chemical departments at the new Trinity College buildings is well merited, and the opinions are of value as coming from professional chemists who have visited the college and have compared the newly-finished rooms with other laboratories in this country and abroad.

The chemical lecture-room, on the ground-floor of the lecture-room block, is about 30 feet wide by 33 feet long; it is 15 feet high, and occupies the width of the block from east to west, thus having the advantage of light on two sides. The side walls are each divided by narrow piers of masonry into three bays. The piers support stone corbels, upon which rest the iron beams of the floor above. At a height of six feet from the floor the walls are pierced by triple windows filled with leaded sashes, one foot eight inches wide and three feet six inches high, with mullions of light stone; these triple openings compose a large window, whose head is marked by a six-lobed opening, the central portion of which is fitted with a circular iron frame swinging on a pivot. A swinging iron frame midway in the height of each window provides for the admission of air, and ventilation is secured by a large fireplace and by ventilators communicating with a great duct in one of the immense chimneys which flank the central portion of the block, and into which empties a horizontal duct extending the length of a wing of the building. The upward current in the great duct is strengthened by means of a steam coil. The chimney-piece of stone, reaching nearly from floor to ceiling, is built with a large hood, the lower opening of which is some six feet from the floor, the projection of the chimney-piece being two feet from the wall face. The room is fitted up in ash. The centre and a portion of the south bays are filled to the face line of the intervening piers by apparatus cases which are lined with zinc painted an India red, for protection against moisture and vermin.

The lecture-table, one of the most important features of the room, is eighteen feet long, two feet nine inches wide, and two feet nine inches high, and is divided symmetrically into seven sections. At the extreme right is a pneumatic trough. To it water is admitted by means of an external cock, and it can be expeditiously emptied by a very large waste-pipe; the overflow is arranged to preserve a constant level, and the trough has movable shelves for the support of apparatus. The other sections are filled by shelves and drawers for various purposes. Gas is introduced at convenient intervals. Swing leaves at either end of the table increase its lineal dimensions to twenty-two feet. A circular opening in the top of the table has communication with a flue carried up in the chimney near by, to serve as a downward draught in experimenting with noxious gases. A sink with drip and supplied with hot and cold water is on the left of the chimney in a portion of one of the south bays.

The lecture-room is connected with two rooms in the central portion of the block, each about sixteen feet by twenty feet, one used as a private office for the professor, the other serving as a private laboratory, and between it and the lecture-room proper is a large segmental-arched opening in the wall, fitted on both sides with sashes hung on weights. This intervening space will be used for experiments in the course of which dangerous gases are evolved. The heel of the opening is a blue-stone slab, for the support of apparatus which is set at a level with the lecture-table, and is equally accessible from the lecture-room and from the laboratory. Across the opening upon the lecture-room side a black-board can be drawn when desired. This board when pushed back runs in a groove between two other boards in a framework, which are hung on chains running over fixed pulleys, and so arranged that when one is raised the other is lowered. The private laboratory is well lighted by double western windows, and also has a north light; it is fitted up with working-tables, open shelves, cupboards, sink and drip, and a Bunsen pump over a working-table.

Beneath the laboratory is an apparatus-room, to which access is had by means of a private staircase; a lift also runs up from this room to the laboratory, to facilitate the transportation of apparatus. Beneath the office is a store-room connected with the apparatus-room, and also with the students' laboratory below the lecture-room before described. This basement laboratory is amply lighted, and is nine feet six inches in the clear. It will be fully equipped. A sand bath and two furnaces for fusions will be built up against the chimney, and apparatus for condensing steam to provide distilled water will also be placed. In time laboratory desks arranged after the manner of alcoves will be put in for the use of students.

The arrangement of these details has been perfected by the professor of chemistry in association with the architect.

CHETWOOD.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

THE regular meeting for May took place at the Architectural Library of the Institute of Technology on Friday, the 3d inst., President Cabot in the chair.

The committee appointed to raise money to assist Mr. J. F. Clarke's proposed explorations among the remains of the Doric order in Europe reported that the requisite amount had been assured to them. The amount voted by the Society for this purpose at the meeting of March 7 is therefore available.

The chairman of the committee on treasurer's accounts reported informally that they had examined the books of the treasurer and found no error in the record of receipts and expenditures so far back as October, 1876. Their examination did not cover any period preceding that date. The committee was then discharged.

The Society then proceeded to consider the subject appointed for discussion: "The Colonial Architecture."

Mr. Stephenson read a paper on the Old Houses of Jamaica Plain, the object being mainly to present a historical record of such houses, and including notices of their architectural characteristics.

Mr. Cabot made a statement concerning the characteristics of some of the colonial houses yet remaining in the neighborhood of Newbern, N. C.

The discussion was illustrated by drawings and photographs of the architectural antiquities of Salem, Marblehead, Boston, and other points in the neighborhood. The point was elicited that the gambrel roof seemed to be indigenous to this country, and followed the pitched roofs, making its appearance about the year 1675. Mr. Ware asserted his belief that it was a feature borrowed by the descendants of the Puritans from the Dutch in New York about the year 1680. The technical peculiarities of the style were considered, especially the characteristic of wide panels, the use of traditional forms in mouldings taken from contemporary works such as those of Batty Langley and Chippendale, and the gradual attenuation of the classic orders, a peculiarity attributed by some of the members to the legitimate influence of material, the proportions preserved in our work of the eighteenth century having been apparently adjusted to the necessities and convenience of constructions in wood.

Mr. Peabody then read a paper on the ante-revolutionary brick architecture and wrought-iron work yet remaining in Philadelphia and its neighborhood, illustrated by sketches. This neighborhood seems to be especially fertile in what is now known as Queen Anne work, apparently affected, however, especially in churches, by traditions from the Swedes who preceded Penn and his followers in the building of the city.

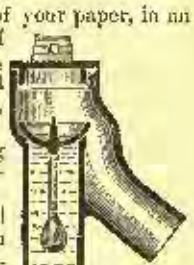
The thanks of the society were cordially voted to Messrs. Stephenson and Peabody for their interesting papers. There were also exhibited at this meeting a portfolio of sketches by Mr. Bulfinch, the architect of the state house, and many other conspicuous buildings of the preceding generation.

After which the meeting adjourned.

WARING'S CHECK-VALVE.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — On page 141, issue of April 27, of your paper, in an article on modern plumbing, you publish a cut of Waring's check-valve which is far from correct, and apt to mislead those who are unacquainted with it, and consequently is an injustice to me, the manufacturer.



The illustration represents this valve as being an utterly useless invention, without accomplishing the results that are claimed for it.

As the illustration shows what this valve will *not* do, I will ask as a matter of justice that you show what it really is by inserting a correct illustration of the valve. Water as a seal has been proved inefficient, and traps that depend upon water as a seal are liable to siphonage or evaporation, and should not be depended upon.

Knowing your disposition to do justice to all, I make the above request. Very respectfully, A. G. MYERS.

MODERN CHURCH ARCHITECTURE.

BOSTON, May 4, 1878.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — It does truly seem impossible that any one can honestly ask: What do we care for previous architecture, etc.; especially to-day when the study of precedent, if not carried far enough, has at least received an attention never hitherto accorded it. Those who would ignore the intellectual inheritance left by the past have happily been well-nigh exterminated by the revolutions of the last hundred years. But it is the consideration of principles, the analytic emulation of methods of thought, not the "copyism" of mere forms of expression, by which alone we can advance. There is no possible substitute for thought, unfortunately, and all attempts to find it have as yet failed, not excepting the delusive endeavor to "catch the spirit" of a past age or a particular race, which aim, stripped of the phrases by which it is carefully enwrapped, is mimicry, not architecture. When, however, we are instructed that there is no choice other than the English Gothic style, that we must now accommodate our American meeting-houses, as best we may, to forms which were developed to meet the marked and peculiar demands of five or six centuries ago, it is not surprising that such Procrustean treatment

too often produces what one of the wisest of our profession has aptly, though with some asperity, termed "pseudo Gothicesque barns, copies of copies by mediæval village masons, which express fickleness, low cunning, hollow affectation, simulation, servility, and thought-flying hurry."[1] Study of the English churches of the Middle Ages cannot, of course, be too highly recommended, nay, insisted upon, but it should be to ascertain the manner in which the builders met the task before them; to gain, when possible, some insight into the more abstract principles of beauty, and not to content ourselves with adopting the solution of their problem as the solution of our own. What should be avoided is the thoughtless abuse of precedent, not its wise use; their means rather than their ends should be chiefly kept in view.

As things are, it is difficult to conceive of a greater lack of constructive trust than is generally displayed by our religious edifices. Yet architects have been more successful in other classes of buildings, and are, perhaps, here not altogether at fault. Such at least seems to be the opinion of the writer who has in your issue of to-day called attention to the indubitable fact that each religion in its architecture has always taken its proper outward expression. Every work of art and notably of architecture is an involuntary and unconscious exponent of the moral and mental nature of its creators. What, it has been asked, will teach a man so much, in so little time, respecting the comparative characters of the Greeks and the Chinese, as a glance at the views, placed side by side, of the Parthenon and a pagoda? Indeed, has any intelligent and unprejudiced mind a truer scale by which to adjudge the worth and loveliness of the beliefs of mankind in different ages than a parallel consideration of the temples of Karnak and Ægina, the Pantheon and St. Sophia, and the houses of worship typical of the thirteenth and of the nineteenth centuries?

Most truly yours, J. T. C.

[1] Edward Lacy Garbett, Rudimentary Treatise.

NOTES AND CLIPPINGS.

A well-planned Competition.—The method adopted for selecting the gas-fixtures of the new Providence City Hall deserves the attention of architects. It is the first case which has come to our notice where a carefully planned competition was arranged for such a piece of work. The following invitation was issued to manufacturers:—

You are hereby respectfully invited to submit an estimate for the gas-fixtures for the new City Hall in Providence, on the following conditions: 1st. Special designs must be submitted for the several stories, and for the several kinds in each story, in style in uniform to the architectural character of the building. The drawings must all be at a scale of one-eighth of full size. 2d. Your estimate must be accompanied by a bond with satisfactory sureties that you will sign a contract within ten days of the award of the contract, the amount of this bond to be equal to twenty per centum of the total amount of your bid. 3d. The committee will not necessarily accept the lowest or any estimate. 4th. The character and artistic merit of the designs, in connection with the estimate, will have weight in awarding the contract. The committee and architect desire that the designs should not exhibit over-elaborate work, preferring solidity of construction, perfection of workmanship, and adaptability to the building. The committee also desire that the total cost of the work shall not exceed $15,000. Your designs, estimates, and bond should be in the hands of the secretary of the committee on or before 12 o'clock, M., Wednesday, April 24, 1878. As soon as an award of the contract has been made your designs will be returned.

All the fixtures to be of the very best quality and workmanship, thoroughly tested, and put up complete in all their parts, to the entire satisfaction of the committee in charge and the architect. All items not mentioned to the contrary are to be of brass, with polished bronze finish, and are to have opal shades of the best quality, of size sufficient to insure a steady flame and proper effect. Burners to be with patent check and lava tips. Each bracket in business rooms to have an independent connection for flexible tubing. Gauze burners to be of French make. No silver brass work, either gilded or stamped, is to be used. Cast work is to be of fine brass, free from sand-holes. Globe-holders to be of cast brass, and to correspond with fixtures to which they are attached. All pendants of four lights and over to be hung with a ball joint.

It was also required that each bidder should make and put up a 3-light bracket as a specimen of style and workmanship, accompanying it with its drawing. Several bids were received, ranging in cost from $6,400 to $11,000. One was thrown out of competition because elaborate drawings were sent in, to double the appointed scale. The committee and the architect examined the designs and bids in consultation, and chose of Messrs. Cornelius & Co., of Philadelphia, were accepted, the price being $9,717.

Painters' Hooks.—Any one who has watched painters suspended on scaffolds outside of a building must have wondered if accidents did not often happen by the straightening out of the large wrought-iron hooks which are their only points of attachment to the building. An accident has lately taken place in St. John, N. B., which shows that these hooks may be dangerous to others than the painters who are suspended from them. During the latter part of last year painters were employed upon the building of Mr. T. H. Hall, on King Street, and as usual made use of these hooks, which, as may easily be understood, quickly punched holes in the galvanized iron cornice. These holes the painters neglected to fill up, and as a consequence the rain and snow filtered through them all winter, slowly washing out the mortar in the brickwork until the upper part of the wall showed signs of being very unsafe. Workmen were at once set to work to repair the damage, but hardly had they removed a few bricks before all the cornice work on the King Street front fell to the ground, destroying all the window-glass in the building, but fortunately not hurting any one.

Fall of a Building.—A four-story brick building, occupied by Brigham, Royce & Co., hardware merchants, on the corner of Main and Market streets, Palmyra, N. Y., fell at noon, May 6th, while undergoing repairs, killing Samuel Traul, a bricklayer.

Cork Linings for Walls.—Russia is using large quantities of cork, which is cut into thin plates, and is then used as a lining for outside walls. It has been used with success in the United States.

The Decoration of St. Thomas's, New York.—Mr. LaFarge, whose illness has delayed the completion of his decoration of the chancel of St. Thomas's Church, was able on Saturday, April 20, to place in position the companion cartoon entitled "The Three Marys." The women are represented as meeting the two angels on the morning of the resurrection. The wainscoting of the chancel wall will next receive the artist's attention.

Working in Caissons.—Workmen on the Poughkeepsie Bridge are paid twenty-five cents an hour for working "under pressure" in the caissons being sunk in the bed of the river for the piers.

A Memorial of General Custer.—A bill was introduced in the House on April 30th by Mr. Williams, of Michigan, to appropriate $25,000 for a monument to General Custer in the city of Washington. The bill authorizes the Joint Committee on the Library to select a statuary group, the central figure of which shall be an equestrian statue of Custer, the whole group being of such a character as shall vividly commemorate his death. It is provided that the group shall be of bronze and at least one and one fourth the size of life.

The Monuments of Great Men.—For some unexplained reason the monuments to great men rise slowly. That to our Washington seems rather to grow into the ground than into the air. And the Wellington monument in St. Paul's Cathedral has been twenty-five years in building. The cathedral itself was erected in twenty-two years, but it has required a year longer to bring nearly to completion the statue and tomb of the hero of Waterloo. This delay would have been dangerous in the case of any man less great than Wellington. A quarter of a century is a long time to put a hero on probation for his monument. While Wellington has been waiting for his crowning honor in St. Paul's, a score of men have risen to great prominence and sunk again into forgetfulness. Fortunate among them are those who secured monumental recognition early; it may be said of them as Bismarck said of the Russians, *beati possidentes*. If they had not secured monuments speedily after death, they never would have had them. The French act promptly in such cases. They thus have two pleasures, that of erecting the monuments to their heroes, and of pulling them down before the men are quite forgotten.—*Hartford Courant.*

A Mine on Fire.—Near Pittsburgh, Penn., is a mine which has been on fire for more than two months, and the owners have at length made a contract with a man who, for $35,000, undertakes to put it out. To the uninitiated the means he intends to employ seem singularly inadequate. He proposes simply to dig a deep trench and fill it with stones, thus making a barrier through which the fire cannot pass.

The Organ for the Trocadéro.—The great four-thousand-pipe organ for the Trocadéro palace, Paris, will not be ready for use before the 1st of July. The musical *fêtes* were to have commenced June 1st.

Equestrian Statue.—The gigantic equestrian statue of Charlemagne, cast by Thiebault, and weighing about sixteen tons, has been erected at Paris, at the entrance to the Exhibition.

Process for Purifying the Air.—A process, according to *Le Naturel*, has been devised, which cools and at the same time purifies the air introduced into dwellings for purposes of ventilation. By means of a fan which rotates rapidly, the air is forced into a closed box, and made to pass through a horizontal diaphragm pierced with holes, over which a very thin layer of water is continually flowing. The air, as it passes through this thin film of water from below, is deprived of its organic particles, which remain in the water, and pass with it into the lower chamber, and are so drawn off, while the air itself passes up through a pipe, in any direction.

A Natural Theatre.—The Temple is a side cañon some four and a half miles from Cañon City, and was discovered but a year or two ago. Once through the great rifts of rock, for all the world like the stairway of some grand place of amusement, the body of the Temple is reached, and, to the tourist's astonishment, before him is a stage with overhanging arch, with "flats" and "flies," with dressing-rooms on either side, and a scene already set as if for some grand tableau. It so intensely realistic from the parquet, as the broad circling floor might aptly be termed, or from the parquet or dress circles, as the higher ledges would suggest, the clamber up to the stage itself renders it all the more so. The stage is at the least thirty feet deep, and some sixty or seventy broad; the arch above is fully one hundred feet from the floor of the cañon, the stage itself being about forty feet above the floor. The arch is almost as smooth and perfectly proportioned as if fashioned by the hand of man. Upon the rear wall of the stage quite an aperture has been hewn out by some action, and the shape it is left in is peculiarly suggestive of tableaux preparation. There is absolutely not a solitary sign of vegetation about the Temple; all is bleak, bare, and towering, and a more weird spot to visit cannot possibly be imagined.—*Rocky Mountain Tourist.*

Wood Injection.—The value of creosote as a wood preserver is generally recognized, but the direct injection requires great quantities of heavy oil and a desiccation of the injected pores. The high boiling point of creosote (300°) does not permit its employment in vapor. Mr. John Blythe formed the idea of saturating a jet of steam with creosote in minute division, forming, so to speak, a gaseous emulsion. The apparatus comprises a high-pressure steam-boiler; another boiler containing creosote, in which the steam is saturated; a vat filled with creosote, to be pumped into the boiler; sheet-iron cylinders, for the pieces which are to be injected; and a system of tubing connecting the several parts. In this way Mr. Blythe completely fills the heart of oak, pine, or red beech; he uses 2 to 3 kilos. of creosote for a cross-tie, and 2 kilos. of brown phenic acid per cubic metre of saturated wood or cross-ties. The cost of preparing a cross-tie, measuring 0.035 m., is from 0.60 f. to 0.70 f. The apparatus can prepare 500 ties per day: the wood comes out softened, so that it can readily be bent or shaped, but it rapidly hardens; at first it shrinks, but after a few weeks it becomes seasoned and resists the influences of moisture; finally, the fibres are greatly strengthened.—*Ann. des Ponts et Chaussées.*

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THE work of denuding London of her churches still goes on. Nearly all the older churches in London are the works of Wren, and as things go it looks as if in a short time England might be robbed of most of the memorials of her most famous architect. It is not very long since we had to record the destruction of two of his churches, and of the tower of another. One is being pulled down at this moment, and we are told that four others are likely soon to follow. Of these, two are said to have spires of remarkable beauty, — St. Mildred, Broad Street, and St. Margaret Pattens. The first is said by a writer in the *Architect* to have also an unusually fine interior. Mr. William Morris has thereupon written a letter to the *Times*, inviting a protest against this action of the church authorities; for, strange to say, it is they who are the offenders. Mr. Morris says with reason that the loss of these churches will be irreparable, for they form a distinct link in the history of English church architecture. He continues: —

"Many persons suppose that by preserving St. Paul's, that architect's great masterpiece, enough will be left to illustrate his views upon ecclesiastical architecture; but this is far from being the case. For, grand as St. Paul's undoubtedly is, it is only one of a class of buildings common enough on the Continent, — imitations of St. Peter's, Rome. In fact, St. Paul's can scarcely be looked upon as an English design, but rather as an English rendering of the great Italian original; whereas the city churches are examples of pure English Renaissance architecture as applied to ecclesiastical purposes, and illustrate a style peculiar to London, and when they are destroyed the phase of architecture which they exhibit will have ceased to exist, and nothing will be left to record it. The Continent possesses nothing in the least resembling our city churches, and the fact that they are all found in such close proximity to one another only seems to make them the more valuable for purposes of study. One great merit which they possess is shown by the fact that, although they are diminutive in point of size, scarcely any one of them being above eighty feet long, they possess a dignity of proportion, a masterly treatment as to scale, which renders them far more imposing than many buildings double and treble their dimensions."

A foreigner would be tempted to say, in fact, that Wren's churches are England's only contribution of value to Renaissance architecture. Wren was the creator of the Renaissance spire, and succeeded as no one else has in planning churches to suit modern Protestant congregations. St. Stephen's, Walbrook, and the steeple of Bow Church are more distinctively his own than St. Paul's. But the city clergy say that his churches, built in what are now the busy parts of the city, are no longer needed, so that it is better to sell their sites for secular uses and build in the suburbs; which sounds very much like what we have heard in American cities. So, even in conservative England, down the churches come.

AN attempt is making, it is said, to revive the manufacture of tapestry in England. It is, perhaps, not a surprising sequel to the encouragement of all kinds of interior decorative work which we have lately seen, especially considering the tendency to revert to old types rather than to invent new ones. That an enthusiasm or a "craze" for Queen Anne or Jacobean art should lead up to tapestries is, in fact, natural enough, were it not that there seems to be the smallest possible chance of such a manufacture proving profitable. There is, to be sure, a very great interest in decoration of all kinds, but the general demand is for something much less costly. There are probably not many among the small class of persons who could afford to hang their walls with tapestries who would not prefer to commute them into paintings at equal cost. The manufacture has never in modern times been able to support itself for more than a short time without state aid. The only works which now survive, the famous Gobelins, have long since been given up as a matter of profit or commerce, and are only kept alive for the sake of the national glory. Their products, which are few, are given as state presents, not sold; though it may be assumed that if there were any market for them they would be given the benefit of it, as is the porcelain of the national factory at Sèvres. The original English tapestry works at Mortlake were established at the beginning of the seventeenth century by one Crane, and the commercial shrewdness of James I. led him to buy an interest in them for two thousand pounds. They proved profitable under this patronage, and it is recorded that the Lord Keeper paid twenty-five thousand pounds for a set of hangings called the Seasons. For these works Charles I. bought, at the instance of Rubens, the Raphael cartoons, which had been sent to Flanders by Leo X. for manufacture, and lay neglected at Brussels. Charles encouraged the works royally, and at the death of the first proprietor bought them in. They were closed under the protectorate, but Cromwell had the good judgment, at the sale of the royal collection of pictures, to secure the cartoons for the nation, though they were at that time so little valued that they were rated at only three hundred pounds, while Mantegna's Triumph of Cæsar was valued at two thousand. After the restoration Charles II. undertook to revive the manufacture, and got so far as to import a painter, Verrio, to direct it. But Verrio was diverted to other uses, and the works were not resumed. Two or three other attempts to produce tapestry were made in England at different times, but without permanent success.

CONGRESS is making its contribution to the cause of the workingman by the joint resolution, which has passed the House, for enforcing the eight-hour law, providing that "while said act remains on the statutes no reduction shall be made in the wages paid by the government to such laborers, workmen, and mechanics on account of the reduction of hours of labor per day, and that all heads of departments, officers and agents of the government are hereby directed to enforce such law as long as the same is not repealed." General Banks argued that the law was based "on the philosophical theory that in the long run a man can do as much work in eight hours as in ten." — a philosophical theory that may or may not be true, but is made nugatory by general experience, which shows that as a matter of fact, whether he can or no, he will not. Mr. S. S. Cox, on the other hand, argued in favor of the resolution on the ground that it would make room for one fifth more men on the government work. Which of these two conflicting arguments prevailed with our Representatives does not appear, but they made haste to pass the resolution. There can be little doubt, however, that the second would appeal more strongly to constituents; and to contractors like Mueller, under the fifteen per cent. rule, this action of Congress will be a great windfall. As for the mass of workingmen, its effect can hardly be felt by them except in producing discontent, because the government employees are after all but a small portion of them, and government wages do not fix the market price of labor. To make the measure really effective, it should be coupled with the provision of the ordinary workingmen's platform that the United States shall give work to every one who asks for it. So long as the number of places on government work is limited, and the labor market remains full, the law will simply give certain workmen easier positions than they can find on private work; that is, it makes a large addition to the number of government appointments, — wherein politicians find their account.

THE world of labor, meanwhile, and its communistic allies, do not grow quiet, in this country or abroad. The Lancashire cotton strikes have been followed by a general lock-out on the part of the employers. The operatives are apparently not in a condition to hold out long; great numbers of them are appealing for public charity, and as we write comes the news that a proposal from the hands for conference and compromise has failed, the men being willing only to submit to a partial reduction, and

the masters insisting on cutting off the whole ten per cent. Thereupon riots have followed, in Blackburn. The house of the Chairman of the Master's Association has been burned, and that of one of the Aldermen mobbed. It was found necessary to bring both infantry and cavalry from Boston and clear the streets. Difficulties continue in the building trades, as masters in one place after another find it necessary to insist on reducing wages. The painters of Liverpool are on a strike in consequence of a reduction, and the carpenters and joiners of Bolton are threatening the same thing for the same cause. Things seem to have reached such a condition in England that, while every opportunity is seized to insist on an advance of wages, every attempt at reduction, no matter under what necessity, is met with bitter and combined resistance, — a condition under which industry cannot long continue, but to which we as well as the rest of the world are tending.

The anxiety over the Communists seems to be increasing, as the extent of their combination becomes better known. The attempt upon the life of the Emperor of Germany, and the threatenings and slaughter breathed out upon the reporter of the *World*, in New York, by one Mégy, who is reported to have borne his share in the murder of the Archbishop of Paris, are probably significant of nothing but the fact, which we knew well enough before, that many leaders of the Commune are brutal and desperate men — though it may do no harm to have it published as widely as possible. The dread of an uprising against law and order has reached New York, where there have been many flying rumors of companies arming and drilling. An appropriation of $200,000 has been made for putting the National Guard, which includes fifteen regiments in the city and Brooklyn, in condition for active service. Consultation with the dealers in arms has led the *Tribune* to conclude that the current reports are greatly exaggerated. It is said that there have been no considerable private sales of arms, and that though there are doubtless many banded socialists in New York, they have among them but few arms, and no money to buy new ones, or ammunition. The city of Chicago has provided itself with a battery of field artillery, which is, perhaps, as persuasive an argument for domestic quiet as is to be had. The work-a-day aspirations of the socialists show still in the platforms of workingmen's meetings; lastly, in that of the National Greenback-Labor Convention at Philadelphia, which calls for paternal government, in the way of abolishing contracts for prison labor, lowering the rate of interest by issuing "free legal tender" money, repealing the resumption act, holding public lands for the use of the actual settler, encouraging manufactures, and constructing public works for the sake of employing labor. The resolutions expressly disclaimed violence or disorder, but the Chairman of the National Executive Committee, in his closing address, instructed the Convention that by electing a president, in 1880, they must emancipate labor, and "dictate themselves the laws of labor and of finance." Hence we infer that even the mildest and most mannerly of the socialist organizations, which lift the banner of the workingman, do not admit the idea of allowing any play for the opinions of those who disagree with them, but propose, like emperors and popes, to set the world right by dictation.

The Senate has passed the joint resolution allowing thirty-six thousand dollars, out of the money heretofore appropriated, to strengthen the foundation of the Washington monument, provided the commission consider it desirable; but with the proviso, unwelcome to the admirers of the monument, that no money should be spent on the superstructure without further action of Congress. This looks to us as if the Senate, or the committee on public buildings and grounds, to whom the resolution was referred, wished not to commit itself beyond recall to carrying out the design as it stands. We fancy, nevertheless, that Congress is pretty well tired of the monument, as the country seems to be, and possibly the importunity of a few enthusiasts may still weary the government into finishing the work and letting us see the difference between a blunder repeated of and a blunder perpetuated.

We are glad to be told that preparation is making in New York for the establishment of a society of draughtsmen. There are many ways in which such a society may be useful, and it would be an advantage if one could be established in every city where there is a considerable number of architectural students. The opportunities of technical study which are afforded to students by the regular course of office practice are more or less limited; they might be greatly increased by association outside of offices. Every student needs constant practice in designing in a variety of ways, for which the routine of his office work gives no great opportunity, but to which an outside society may be made to give a healthful stimulus. The study of professional literature, too, is apt to be neglected under pressure of routine work, unless there is some influence of association to keep it up. A society can do much for this by providing such books and more inaccessible periodicals as are ordinarily out of reach, besides encouraging the spirit of study which leads to their use. When the course of professional study is so indefinite, and the means to it so uncertain, as is the case with us outside the architectural schools, there is especial use for all the help that association can give. We need, among other things, a better standard of draughtsmanship than is common at present, and a wider range of execution, in which there is some danger that we shall come to be limited to a moderate excellence in one kind of drawing with pen and ink. But the greatest need, for the moment, of our profession in the United States is a community of interest, *esprit de corps*, readiness to unite in the study of the common welfare. It is to the coming men especially that we are to look for the growth of professional union. The Portfolio Club of Boston, while its activity lasted, was an example of what association will do for the young members of a profession. It has left its mark in the two series of sketch books that we owe to its effort and example, and to the success of which we owe remotely, the establishment of this journal.

At a late meeting of the Royal Institute of British Architects, Mr. Thomas Blashill, Jr., who has investigated the matter sufficiently to be permitted to speak with authority, read a paper on the use of chestnut in old timber-roofs. He said that during the sixteenth and seventeenth centuries the belief obtained that chestnut had been used in many old roofs, and that it was better than oak for such purposes. Wren and Evelyn, amongst others, gave their adherence to the idea. This belief grew steadily until at length the Society of Arts offered premiums to encourage planting chestnut-trees, and it had become a matter of present interest to determine whether it had a foundation in fact, because the trees planted at that time were now mature and their timber was being sold in the market as equal to oak timber, and sometimes as oak timber itself. There were very few timber-roofs of which it had not been asserted that their timbers were of chestnut; and yet Sir Gilbert Scott and M. Viollet-le-Duc, men of largest experience in such matters, said that they have never known a single instance of its use. It had not been a difficult thing to prove that timbers said to be chestnut were in truth oak, for a fresh cross-section always showed the nature of the wood in this way: in oak the medullary rays are collected into plates which appear distinctly radiating from the centre when a cross-cut is made, while in the chestnut these rays are distinct from one another, evenly distributed, and quite invisible to the naked eye. The "flower" of oak panelling is caused by the exposed surfaces of these medullary plates, and is a beauty to which chestnut can lay no claim. The reason that English oak is superior to American oak in beauty is that its medullary rays are more numerous; the same fact accounts for its slightly greater strength, for that the strength of oak is due to these plates of rays is easy to discover by examining a piece of oak submitted to constant wear, a hand rail for instance, where it will be seen that the edges of the plates stand up above the general surface. There would be little danger of a doubtful identity in this country, where chestnut is almost in as constant use as oak, and the difference is commonly well understood. An American architect would hardly hesitate to use it in any position where he would use oak, except as a matter of beauty, taking due account of the fact that its strength is less. It is, on the other hand, somewhat easier to work than oak, and is thought to warp and split less in seasoning, we believe; while its durability is vouched for by the fact that it is preferred to other woods for railroad ties or "sleepers."

THE GOLDSMITHS' WORK AT MYCENÆ. I.

The bodies as they lay on the funeral pyres had been piled with golden ornaments and vessels of gold and silver. The women in the third tomb were buried in a heap of ornaments and jewels, among which were no less than seven hundred disks of gold *repoussée* work in a variety of patterns, large flat

rounded leaves with stems and veins, flat pieces of gold engraved in intaglio, necklaces, pendants, and flat ornaments in the shape of women and animals, and many large flowers of several gold leaves fastened in the middle, all these ornaments looking as if they were intended to be sewn upon the women's robes. One head wore for a crown a thin broad band of gold with a border of standing flowers on its upper edge, and by the other bodies were several diadems, likewise thin bands of gold, richly ornamented in relief. It is reasonable enough to suppose from their great differences and individuality that the golden masks which covered the faces of several of the men were meant for portrait masks, excepting one which represented a lion's face. To provide them for the burial was a natural means of hiding from the spectators the painful destruction of the features by the funeral fires. The heaps of bronze swords, stone arrowheads, and battle axes of both stone and bronze, showed that the warriors, like those of all primitive peoples, were buried with their arms. The rows of gold buttons, lying beside the swords as if fallen from the scabbards, their golden hilts, shoulder-belts, and breast-plates, show the splendor of their panoplies, and their graves were strewn with cups of gold and silver. The collection of copper kettles and cans in the largest tomb shows that these too were a highly prized part of their wealth.

The workmanship of the metal objects suggests some interesting speculations. Except for the bronze swords and axes, which must have been cast, there is hardly an indication of any work but that of the hammer and graver. With all their profusion of gold it is clear that the men of that early day understood, almost as well as we of the nineteenth century, how to make a little material go a great way. A few rings and seal-like pieces of gold engraved in intaglio, and one or two ornaments which Dr. Schliemann distinguishes as "massive," are apparently the only things of that metal in his enormous collection that are not wrought out of thin plates. There are indications that most of the abundant *repoussée* work was extremely thin, although he says little about this. The one piece of gold that was spared for analysis is said to have been only one one-hundredth of an inch thick, which is about the thickness, under firm compression, of two leaves of the paper on which this is printed. Even the cups and larger objects which Dr. Schliemann calls heavy, are apt to show, in his illustrations, a finely crumpled surface which indicates thin metal. The gold was remarkably pure, and therefore remarkably pliant; for the piece that was analyzed was alloyed only with ten per cent. of silver. The softness of the gold of one of the masks is especially mentioned.

Dr. Schliemann quotes from Prof. Lauderer a supposition that the *repoussée* work was hammered out upon a block of lead, as is done nowadays, and the finest of the work may very well have been done in this way. But the character of much of it, and especially its constant reduplication, suggests a different process, of which an explanation is furnished by the book itself, though apparently unnoticed by its author. He found in one sepulchre seven hundred thin gold disks, of two or three inches in diameter, and he gives ten illustrations which, he says, include all the different forms of them. He found also in one tomb fifty-three cuttle-fish, apparently of thin gold, and "perfectly alike." All these, and many things of like character that are given, have the rough-edged look of ornaments that are cheaply swaged out or stamped with a die. Many of them are found in pairs, some actually soldered together, and others provided with rivet holes in the edges. In one case a silver pin was found, with a broad flat head of gold, composed of two hollow shells soldered together back to back, clasping the pin between them. There were many similar objects with the halves separated, but clearly intended for a like use. It is noticeable too that the ornaments of this kind are symmetrical about one axis, so that the two halves could be made on a single pattern and put together, unaffected by reversing. These things could hardly have been made and duplicated by hand work, merely hammering into lead. Much as we like to believe in the unsophisticated simplicity of the heroic ages, and shrink from the idea of their employing the tricks of cheap manufacture, it is in evidence here that they had a plentiful supply of cheap jewelry, made thin and hollow, and endlessly repeated from stock patterns, as children's tin horses are made, or as such jewelry is made nowadays, but with this difference, nevertheless, that it was really made of gold, and was worn apparently by persons of royal blood. There is a good deal of Etruscan and Egyptian jewelry to be found in various museums which is made in halves in this way, sometimes hollow and sometimes filled with baser metal; but it is generally in pieces of small size and delicate workmanship, such as pendants to earrings and necklaces. It is only in Mycenæ, as yet, that proofs have been found of its manufacture on a large scale and by rough processes, as if to suit the tastes of a semi-barbarous people.

Now Dr. Schliemann gives us (pp. 107, 109) cuts of two blocks of stone, one of granite and one of basalt, on the faces of which are sunk intaglios of ornaments resembling in character the cheap jewelry of which we have spoken. He considers them to be moulds in which gold ornaments were cast. But two or three difficulties present themselves. There were practically no cast ornaments found at Mycenæ. Among the thousands of ornaments enumerated in the book, but one is believed to have been cast. Then too the indentations in the surfaces of the blocks are apparently very shallow, so shallow that it would have been very difficult, not to say impossible, to cast in them with any success, especially since there are no vent-holes, and the blocks seem too roughly finished to have received a cover. In this respect they differ from moulds of clay stone which Dr. Schliemann found at Hissarlik, and from others found by Mr. Layard at Nineveh, in which the sinkages are deep and extend to the edges of the blocks, or are provided with vent-holes, where too the surfaces are smoothly dressed so as to fit a reverse or cover, showing in some places the holes for the pins or dowels by which they were adjusted to each other. We may confess, too, that we have never been able to see how moulds of ordinary stone, although they might do for metals that fuse easily, could be used for casting gold. It is to be remembered that gold is rather less fusible than cast iron, not melting till it is nearly at a white heat. A mould of sand or clay will stand such a temperature; but one of any granite with which we are acquainted would be destroyed by it. Nevertheless Mr. Layard assures us that such moulds as he found at Kouyunjik and Nimroud are in use among the Arab goldsmiths at this day, although he does not tell us how they are used. But a hard compact stone like the granite (which we suppose to mean syenite), or basalt, is a very appropriate material for a mould in which a sharp, minutely finished intaglio is to be cut in order that a plate of pliant metal may be hammered into shape upon it with punches. This seems to us likely to be the office of these moulds, and the explanation of the character and multiplication of the ornaments found in such profusion.

Many of the ornaments, however, are of much better execution than those we have just mentioned; the large gold flowers, for instance, made of leaves cut from sheets as if with the shears, leaves which apparently do not exactly repeat each other. The diadems are, if we may judge from Dr. Schliemann's illustrations, much more finely wrought than the rest of the ornaments. They are oval bands of gold from eighteen inches to two feet long, from four to six inches wide in the middle and tapering at both ends. They appear to be wrought with great delicacy and precision, and look as if they had been hammered up by hand very skilfully and finished with the graver. In design and execution alike they are much superior to the comparatively rude adornments which filled the tombs in such profusion. These diadems, like all the rest of the work, seem to be of very thin metal, pliant enough to adapt themselves to the head, and some so thin that they are strengthened by piping their edges with copper wire, another device which is commonly credited to modern times alone.

URBAN HOUSING. III.

USE OF FRONTAGE. WIDTH OF STREETS — THE TENEMENT HOUSES POSSIBLE ON SMALLER LOTS.

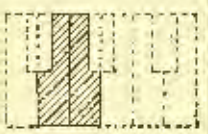
LET us take two plots of ground, each two hundred feet square, as in the previous example, and lay one out as before in the usual New York 25x100 feet lots, and the other with short streets running through the plot, and with shallow lots, each forty feet wide as well as forty feet deep, fronting on them. If we make the streets each twenty feet wide, there will be enough land left for twenty such lots. If we put one house on each lot we shall have twenty houses. Each house can have a frontage of forty feet.

Now in cities, where houses are placed close together, side by side, with party walls between them, it is possible to have windows only on the front and rear of a house. The object of windows is to get light and air into a house. The more front and rear wall we have the more windows we can have, and the more light and air in the body of the house. Sixteen houses, each of twenty-five feet front, have, together, four hundred feet of frontage. Twenty houses, each of forty feet front, have, altogether, eight hundred feet of frontage. We see we have twice as much frontage by the latter arrangement.

Similarly, we have double the amount of rear wall. With double the amount of front and rear wall we can have double the number of windows, and so double the amount of light and air in a house. If our object is windows, light, and air, it would seem that this arrangement accomplishes it. Instead of a few large houses, it will give us many small ones, as was shown in a previous example; or, instead of encouraging the building of narrow, deep, and dark houses, it will give us wide and shallow and well-lighted houses, as in the present example.

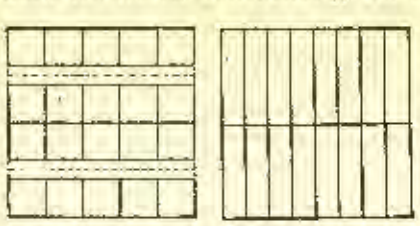
But it may be asked, and very properly, Will not such streets or lanes as are shown in these examples be narrow, sunless, damp, and gloomy? It is difficult to find a short street of exactly the same width, open at both ends, and with one of those ends opening toward the midday sun, in exactly the same direction, and built up along its whole length on both sides with houses of the height contemplated in the proposed streets, such as alone would suffice as an example to give a full answer to this important question. We had, however, in Jauncy Court, in Wall Street, New York, an example of a street nineteen feet wide, with houses four stories high on each side of it, occupied as offices by some of the leading law firms of the country for many years, although it opened only to the north, and was by no means so favorably placed as to currents of air in summer, and the sun at all seasons, as these proposed streets.

We have, in the case of the spaces between the "back buildings," as they are called, of most private houses of the best class, in Philadelphia, a still more pertinent example. These back buildings generally contain the dining-rooms and nurseries, as well as the kitchens, of the houses. They do not occupy the full width of the lot. A strip of land from four to seven feet wide is left on one side, on which their windows open, and each is divided on the other side by a party wall from the back building of the next house. The back buildings of the houses stand in pairs, and are rights and lefts, like a pair of shoes. When a number of these pairs of houses stand in a row, the strip of land left unbuilt on, and on which the windows of the back building face, adjoins a like strip belonging to the back building of the next house beyond. The two strips together thus make a narrow court from eight to fourteen feet wide, on which the windows of the kitchens, dining-rooms, nurseries, and other rooms most lived-in generally face. Where the house fronts the north and these courts are open to the south, they are bright and sunny. The majority of the windows facing east have the sun a part of the morning, or all the morning if in the upper stories. The majority of the windows facing west have the sun a part of the afternoon, or all the afternoon if in the upper stories. The sunny brightness of these courts is increased by the reflection of the sunlight, from whichever wall it happens to fall upon, on to the wall and into the windows opposite.



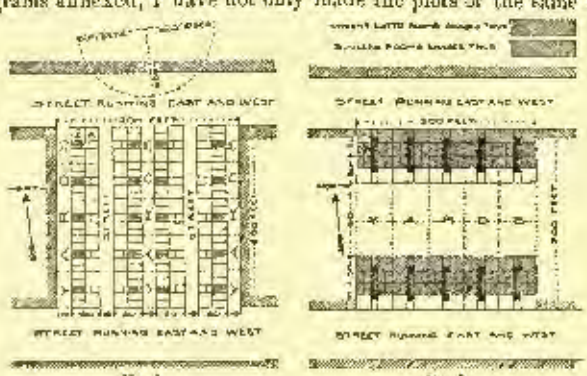
I have made the streets in these examples twenty feet wide, or nearly double the width of the spaces on which we find the windows of some of the most lived-in rooms of the best class of Philadelphia houses facing, and wider than Jauncy Court. The best width for such spaces or streets would depend on the situation and size of the plot of ground to which they belong, and the character of the buildings to be erected upon it. It may, in the long run, be safely left to the intelligence of architects and builders and landlords, and the promptings of self-interest, without calling in the philanthropist or the legislator. The fact that it will not pay to make streets which are dark, damp, gloomy, and unattractive will prevent the making of such streets on private property.

While I have felt that the question of the width of streets, if left to the owners of the property along them, as indeed all questions connected with real estate if left to those most interested in its prosperity, would be managed, not with the inflexible sameness of the New York streets, but with infinitely greater adaptability to the wants of its inhabitants, yet, for purposes of comparison, I have supposed, in the following example, the same number housed on a given space as are now housed on a space of like size, in New York, under the stimulus to overbuilding, and so to overcrowding, given by the system of uniform deep lots. The number housed is the same in both diagrams, not to recommend packing people so closely together, and not to recommend that width of street, but to show that even in such narrow streets homes, where the inhabitants can have windows, light, and air in every room, and can have thorough draughts of air through their dwellings at any time desired; where, owing to the direction of the streets and their open ends facing south, they will have the benefit of the cooling evening sea breeze from the south in summer, and be protected from the cold westerly winds and easterly storms of other seasons, are better than the dwellings provided under the New York system of wide streets, better than the homes created for them by the system of deep lots, better than such tenements as will be seen in diagram No. 2 of the next example, better than tenements where it is impossible to get a draught of air through them however stilling they may be, better than tenements which have no adequate ventilation of any kind from the time the houses are built to the time when they must be pulled down as fever breeding, or otherwise come to their end.



And, as with the width of the streets or lanes, so with the size and number of the tenements. I have drawn the two following diagrams, with the same number of tenements on each, not to recommend the putting of that number of tenements on that space of ground, but to show how, if they must be put there, they may be arranged so as to avoid the "worst evil" of overcrowding. Acting on the assumption of those who hold that the overcrowding of New York tenement houses is a necessary evil, consequent on the limited size of the island on which New York is placed (an assumption which I do not believe for a moment), I proceed to show to those who so believe how to crowd people *in the most humane manner*. In so doing, I suggest a system that is also capable of being followed with fewer families on the same space, so as to make flats or suites of rooms of any extent, with wider streets, etc., and to meet the wants of every class of society, and to afford the most comfort and healthfulness of arrangement at the least expense.

With this preface let us now proceed to take another example, and the last the limits of this article will allow of. Let us take the two plots of ground as before, each two hundred feet square, and lay them out as in the last example, but with, for purposes of comparison, a somewhat different spacing of yards and streets; and let us now further suppose the houses on these plots to be intended for tenement houses. In this example, as will be seen by a study of the diagrams annexed, I have not only made the plots of the same size,



No. 1. No. 2.

but have also made the number of tenements and the size and arrangement of each tenement precisely the same in both cases. It seems to me that in this way these diagrams show, more clearly than any words can do, that the dark, unventilated inside rooms, which form the worst feature of New York tenement houses, do not arise from the limited width of Manhattan Island, as has been so often asserted, but that they arise on the contrary from the way in which the tenements are grouped together. They show also how, in future, by a different grouping, those main evils can be wholly avoided; and further show that this can be done without loss of space, and that, under the system that they propose, as many persons can be housed comfortably and healthfully on a given space as are now, under the present system, housed uncomfortably and most unhealthfully.

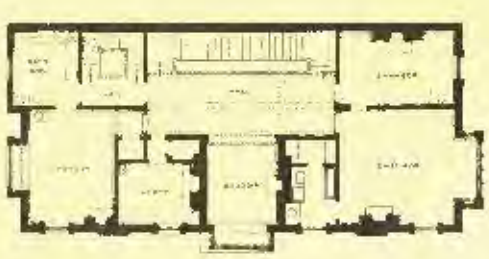
In presenting these contributions toward a better understanding of the influence of imposing inflexible conditions on the distribution of real estate, and making all lots in a city of one size, and that a large size; in showing how deep lots encourage the building of deep houses, and how deep houses necessitate inside rooms, which cannot but be insufficiently lighted and ventilated, and which are therefore not fit for human habitation, my object has been to urge, not a much-needed charity, but a better political economy. And also, in making the plan for tenement houses shown in diagram No. 1, my aim has been to get at a system combining such economy of space and materials as would recommend the system *to owners and builders of tenement houses*, while at the same time securing better accommodations for tenement house occupants, and, especially by providing light and ventilation in their sleeping places, to increase their comfort, elevate their standard of living, and benefit the public health.

The majority of the tenement houses in New York are situated in streets running east and west. From the way the upper part of the city is laid out, this is and must always be the case, as the majority of the streets run east and west. The present system of building tenement houses is to build them fronting on the street, and either one or two tenements deep. In either case they consist of a living-room, lighted from the street or yard, and two dark bedrooms placed behind it, in the body of the house, which are thus "inside rooms," getting no light or air except through the living-room. In the case of the "two deep" tenements, which are the greater part of the whole number, it is impossible to have a current of air through them, to cool them in summer or to air them at any time. In addition to this their greatest evil, those tenements fronting north, that is half of the majority of the tenements in New York, get no sun, or next to none, from one year's end to the other.

Diagram No. 2 shows two rows of two deep tenement houses built

SIDE ELEVATION

FRONT ELEVATION



SECOND FLOOR PLAN

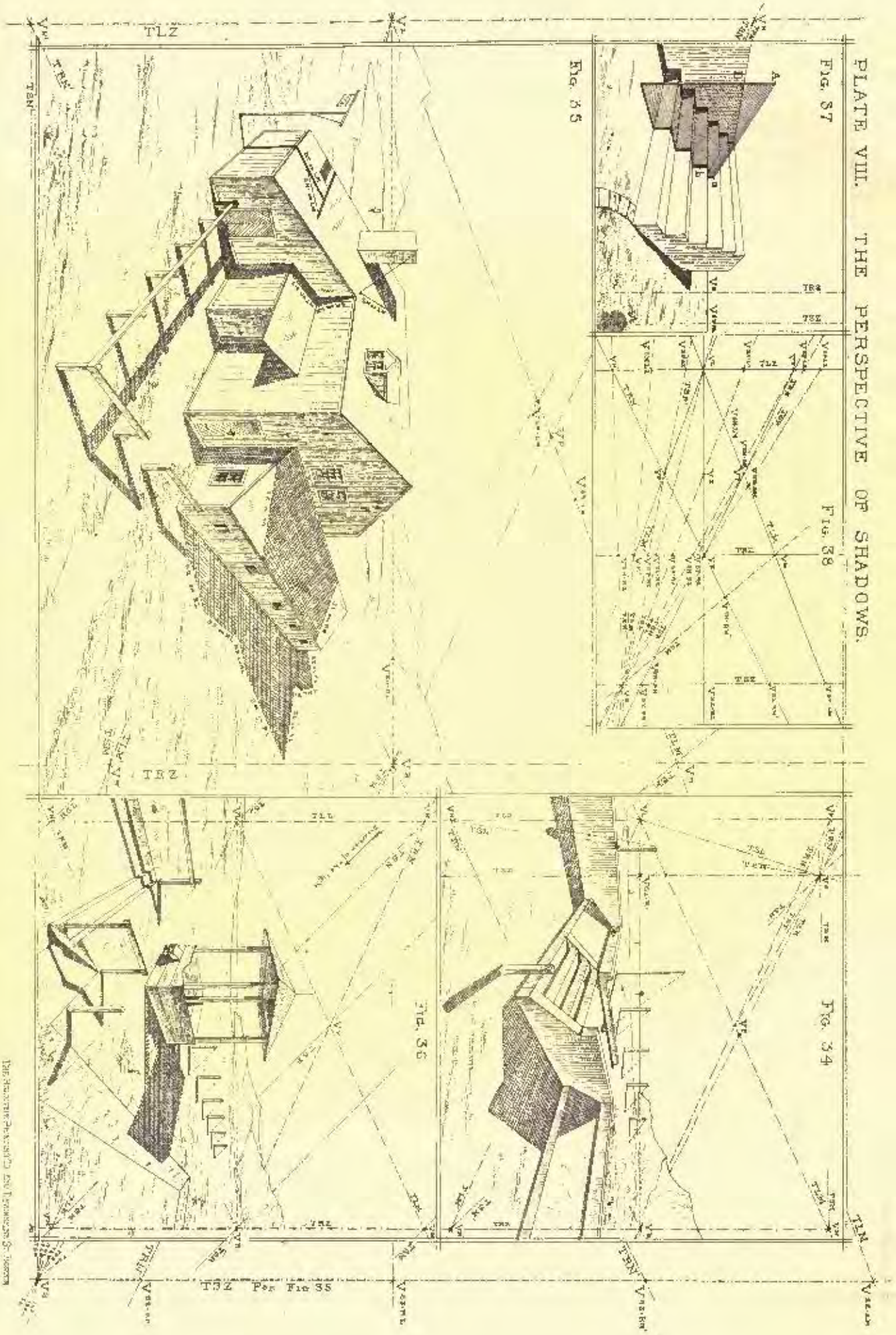
FIRST FLOOR PLAN

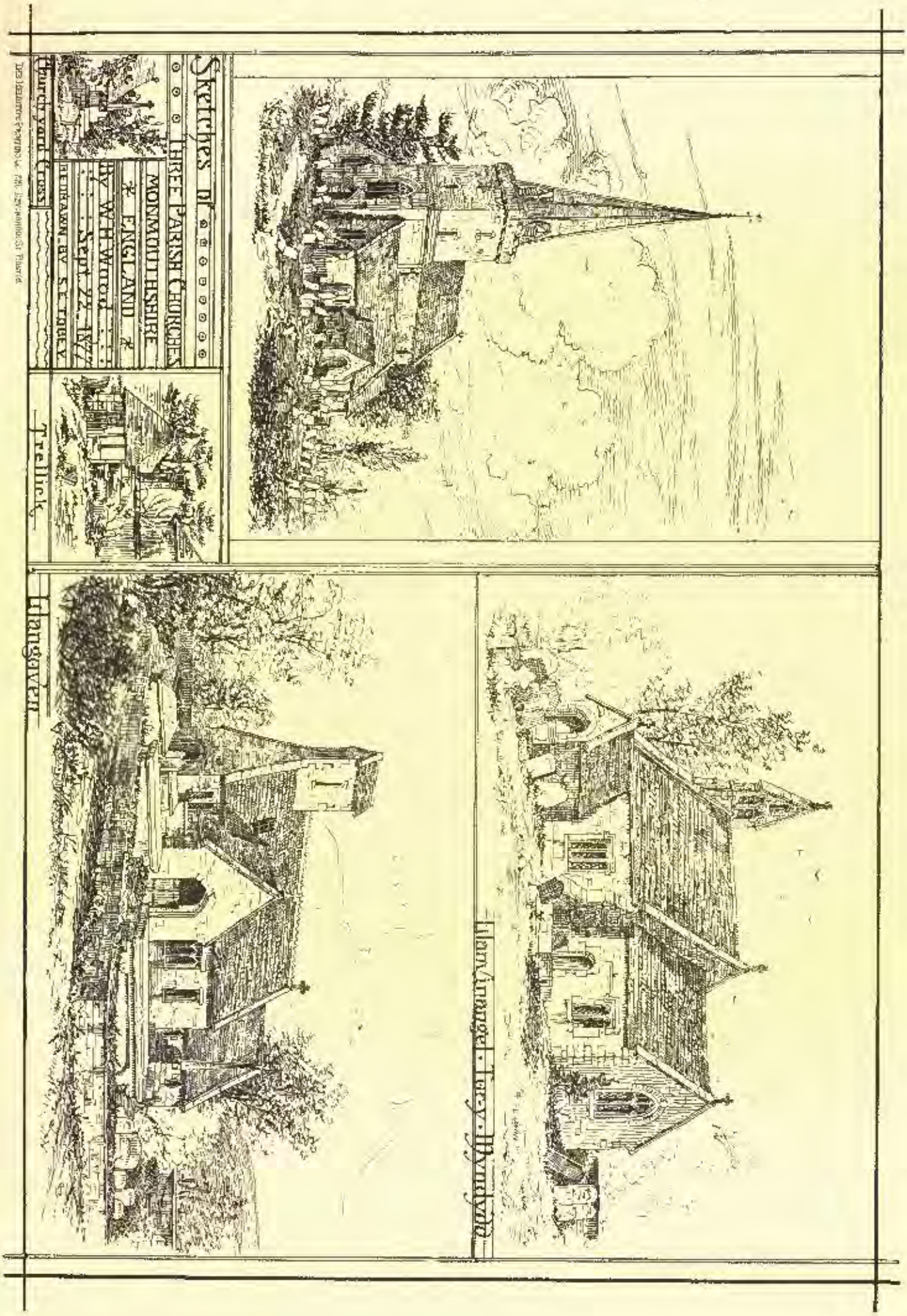
THE HELIOTYPE PRINTING CO. 330 CONGRESS ST. BOSTON

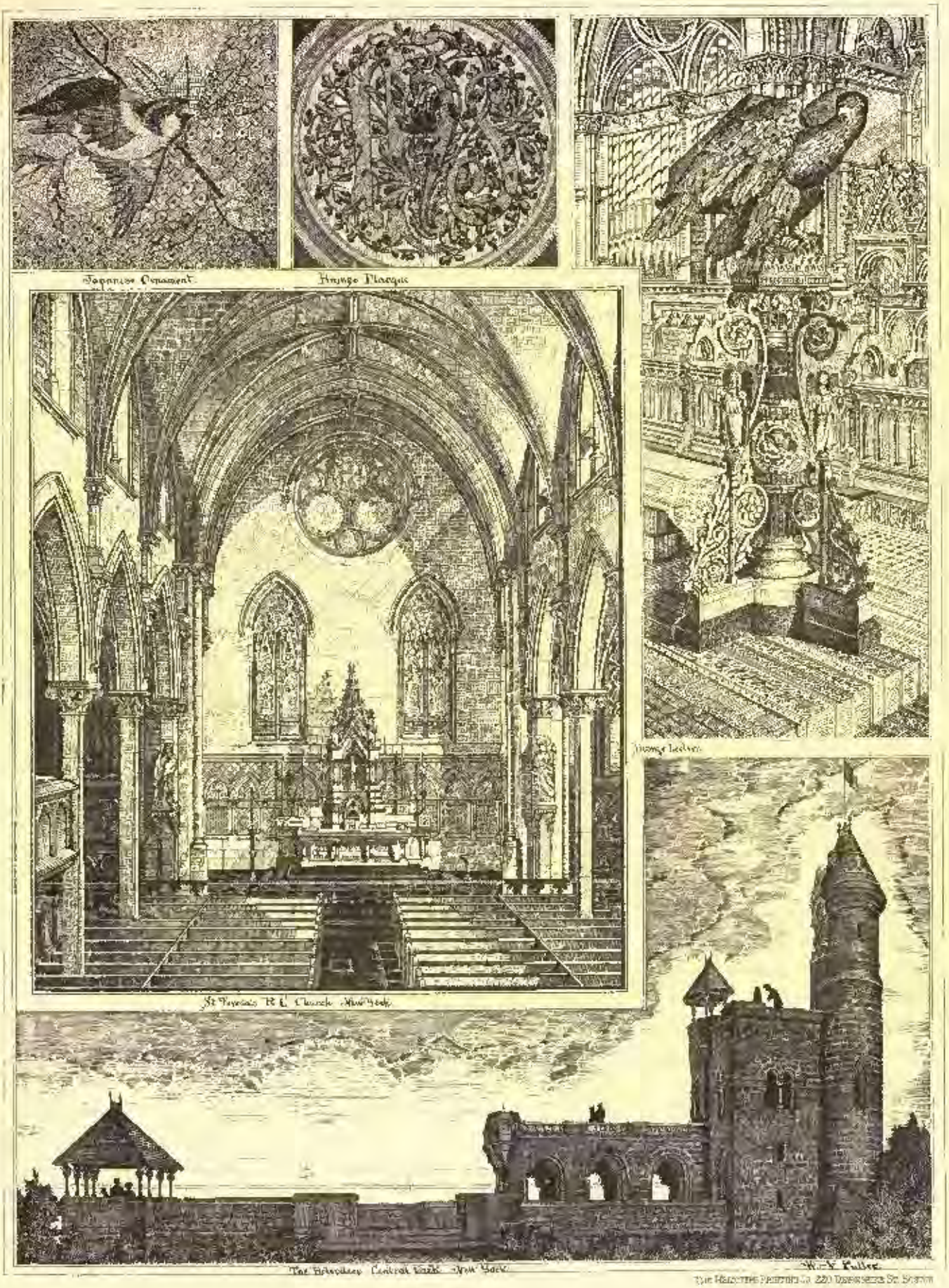
HOUSE OF MRS. FISKE, BOSTON, MASS.

MESSRS. CUMMINGS & SEARS, ARCH'TS.

PLATE VIII. THE PERSPECTIVE OF SHADOWS.




Sketches of
Three Parish Churches
Monmouthshire
England
By W. H. Wood
Sept. 22. 1877
Redrawn by S. E. Tobey
Churchyard Cross
Trellick
Llangoven
Llanvinangel Tercy Mynydd


Japanese Ornament.
Kinnge Plaque
Kinnge Ledger
St Vincent's R. C. Church New York
The Belvedere Central Park New York
W. V. Fuller

THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON

according to the present system. Each row of tenement houses consists of two rows of tenements placed back to back, so that the bedrooms are shut up in the body of the house.

Diagram No. 1 shows how these evils may be wholly avoided, with no sacrifice of space or diminution of the number or size of the tenements, by placing these rows of tenements at equal distances from each other, thus securing air and light; and, by having them face east and west (as shown in diagram No. 1) instead of north and south (as shown in diagram No. 2), securing to every room, whether living-room or bedroom, an hour or two, or more, of sunshine daily. The passage-ways between the houses would be short, narrow streets, running through from street to street, open at the ends, thus giving free passage for air and sunshine throughout the year.

The space occupied, the number of tenements, and the size of each tenement, are the same in both cases. The diagrams show this. This plan recommends itself, therefore, to those who may be led to believe that the main evils of the tenement houses in New York result not from overcrowding, but from the manner of the overcrowding.

RECAPITULATION.

Tenement houses in New York with the same number of families on the same space.

PRESENT SYSTEM.	IMPROVED SYSTEM.
Most of the bedrooms have no windows, light, or air.	All the bedrooms have windows, light, and air.
It is not possible in hot weather to get a current of air through most of the tenements.	It is possible in hot weather to get a current of air through every tenement.
Half of the tenements never have any sunlight the year round.	All the tenements have sunlight, front and rear, the year round.
Dark halls and stairs.	Light halls and stairs.
Escape in case of fire impossible or difficult.	Easy escape in case of fire.
A trifling saving in cost of building is gained by sacrificing the health and comfort of the tenants, and results in lower returns from the capital invested.	A trifling increase in cost of building provides for the health and comfort of the tenants, and results in better returns from the capital invested.

But, while the system of building houses not more than two rooms deep, so that every room may have windows, light, and air, is set forth in diagram No. 1 in such a way as to recommend itself to those who may, for any reason, want to house as many people as possible on a given piece of land, and who yet would prefer, in doing so, to avoid the worst evil of the present New York tenement houses, yet it shows only one of an almost infinite variety of plans which may be made, founded on that system. The same system can be used and have wider streets,[1] and where desirable larger suites of rooms. This can be done to any extent, and preserve all the advantages of the system, and avoid all the evils of inside rooms, which, not only in tenement houses but in the present style of flats, have unfortunately become common and are in all cases found greatly prejudicial to health and to comfort of living. With houses built shallow, so that each tenement has air and light and sun, front and rear, and in every room, the *possibility* of wholesome and happy homes is secured. Under the present system wholesome and happy homes are *impossible*.

An effort has been made in these articles to set forth, what has seemed to me, the worst evil of our New York tenement houses. From what I have seen in other cities and countries, and from what I can learn from those who have given the evils of the lodging-houses of the poorest classes in London and elsewhere special attention, this particular and most flagrant evil of having inside bedrooms and other rooms without windows, light, or air is nowhere to be found except in New York, and in those cities which have, in whole or in part, a deep-lot system similar to that of New York. "We have," says one devoted to good works, when shown this feature of the New York tenement houses, "lodging-house horrors enough in London, but nothing like that — nothing so bad as that." I have also endeavored to show, by a variety of examples taken from the infinite number possible to be made, how by recognizing the cause and attacking it, by violating the New York system of lots, by subdividing the blocks and intersecting them by wide or narrow streets, we may obtain, even in New York, shallow lots which offer no premium to over-deep building, and on which the best form of house from a sanitary point of view, the best form of house if occupied by but one family, and still more the best form of house if occupied by a number of families, namely, the house which is but two rooms deep, with windows front and rear, will not only be possible, but will also be the most profitable. If a house is but two rooms deep, with windows front and rear, there can be no dark, unventilated, windowless rooms in it. I have endeavored to show why, in New York and its imitators, alone of the civilized world, such houses are ceasing to exist, and then how even in New York they may be obtained; and further to show how, even putting as many people on a given area as are now in the worst crowded tenement houses, they may be housed in tenements with light and air in every room.

The present New York system puts a premium on overbuilding. The system presented in this article would put the premium on open spaces. The value of open spaces is apparent when they are in front of buildings; it is overlooked when they are in back yards and add nothing to the attractiveness, or the apparent attractiveness, of buildings. If in front, they address the general public, and in so far as they add to the charm of site and appearance of importance of a building, in so far they may be safely left to take care of themselves. Attractiveness which is added to a house by unbuilt-on land in front of it is a much cheaper attractiveness than is added by built-on land in the rear of it.

Any capitalist can see this when it is put clearly before him. The difficulty is to state it so as to put it clearly. We have all felt that in reference to the housing of the poor and those of moderate means there is "something wrong the matter" in New York; but the question has been what it is. Unfortunately, the notion that the size of the island was the wrong matter, although it was the saddest of notions to contemplate as far as the present and future of New York was concerned, seemed such a sufficient and convincing explanation (it gives such rest to the soul to get at a certainty, and to feel relieved of responsibility thereby!) that it has not only paralyzed a study of the subject, but it hinders most persons from taking any other view of the subject. "The greatest pain a human being can have," says a late writer, "is the pain of entertaining a new idea."

The New York system says to the architect, the builder, the physician, the sanitarian, the philanthropist: "Expand yourselves. Let us see what you can do." The cook might as well say to the dough in the waffle-iron: "Expand yourself; expand in any way you please; let us see what you can do." One is as easy to say as the other; and one is as easy to do as the other. We are told, in New York, that the evils of our tenement houses, the like of which, if troglodytes are no more, is not upon the face of the earth, — evils which creep into every class of society, and harm in unnumbered and curiously unsuspected ways, — are evils that cannot be helped, are evils for which there is no cure, and that New York is cursed above all the cities of the earth in its situation, which carries with it these evils, and shuts out hope of ever being free of them. What New Yorker is willing to believe this?

[1] If the yard spaces, shown on the diagram No. 1, be wholly left open as lanes, or be left in common but with gates at the ends, or else have passages of communication railed or fenced off as the back of them, so that the ashes and garbage may be removed in the rear of the houses, no additional advantage will be gained in the cleanliness of the streets resulting therefrom.

THE ILLUSTRATIONS.

SKETCHES OF THREE PARISH CHURCHES IN MONMOUTHSHIRE, ENGLAND. BY MR. WILLIAM HALSEY WOOD, ARCHITECT.

THESE sketches were made during a recent tour through England, and represent fairly the picturesqueness of numerous small parish churches so characteristic of a farming district.

ST. TERESA'S CHURCH, ETC., NEW YORK, N. Y.

STUDY IN PERSPECTIVE — PLATE VIII.

See Paper on Perspective in this number.

HOUSE ON CLARENDON STREET, BOSTON, MASS. MESSRS. CUMMINGS AND SEARS, ARCHITECTS, BOSTON.

PAPERS ON PERSPECTIVE.

IX. THE PERSPECTIVE OF SHADOWS.

170. THE rays of the sun, being practically parallel, constitute a single system of parallel lines, with the same two vanishing points, 180° apart. (5.) Both these vanishing points may be found by looking in the direction followed by the rays. If one looks up in the direction of the rays, he of course sees the sun itself. If he looks down, away from the sun, he sees the shadow of his own head. Of the two vanishing points of the system, then, one is in the sun itself, and the other, just opposite, is in the shadow of the spectator's head, and is of course as far below the horizon as the sun is above it.

171. If the sun is in front of the spectator, it is the first of these vanishing points, that in the sun itself, which is behind the plane of the picture, as in Fig. 34, and the vanishing point of the sun's rays, Vs, is above the horizon. If the sun is behind the spectator, as in Fig. 35, the other vanishing point is in the plane of the picture, and Vs, which we now call the vanishing point of shadows, since every point throws its shadow towards it, is below the horizon. It appears in the figure in the extreme right-hand lower corner of the plate, beyond Fig. 36. If the sun is just in the plane of the picture, neither in front of the spectator nor behind him, but on one side or above, the light falls parallel with the plane of the picture, and both vanishing points are at an infinite distance upon that plane. This is illustrated in Fig. 36.

172. The shadow of every point is accordingly a line proceeding from that point, through the air, towards the vanishing point of shadows. This line is generally invisible, the air being generally transparent; but when the air is loaded with dust or moisture this line of shadow becomes visible, as is often witnessed at sunset, when the shadows of clouds near the western horizon are thrown across the sky in parallel lines, — lines which seem to converge towards the sun in the west, and in the east to converge towards the vanishing point of shadows opposite the sun. If this invisible shadow of a point strikes any solid object it becomes visible as a point of shadow on its surface. The *invisible* shadow of a point, then, is a line in space; the *visible* shadow of a point is a point situated where the line of invisible shadow pierces any intercepting surface upon which the shadow may fall.

173. In like manner, the *invisible* shadow of a line is a surface in space, and the *visible* shadow of the line is a line, being the line in which this surface intersects the surface upon which the shadow falls. If the line that casts the shadow is curved, the invisible shadow is cylindrical; if it is a straight line that casts the shadow, the shadow in space is a plane, and if the surface that receives it is also a plane, the line of visible shadow is a straight line, being the line of intersection of two planes.

In Fig. 37 both the visible and the invisible shadows of a line are represented. The sun is supposed to be behind the spectator, in such a position that the shadow of the spectator's head is thrown upon the ground within the limits of the picture at V^b. The rays of light, and the shadows of every point in the line are directed towards this point. The shadow in space is seen to be a plane, and the shadow on the ground and steps is seen to be the intersection of this plane by the several planes which it encounters. It sometimes happens in photographs that the shadow of the camera is seen in the foreground, at the vanishing point of shadows.

174. If a solid body casts a shadow, the *invisible* shadow, passing downward through the air away from the sun, is a solid cylinder, or solid prism, according as the line upon the body that casts the shadow is a curved line or rectilinear. This line is obviously the line upon the surface of the body which separates the side towards the sun, which is in light, from the shady side. This line is called the *dividing line of light and shade*. The *visible* shadow of the solid object, seen upon any other object, is a surface, the shape of which is determined by the shadow cast by the line of light and shade.

To find the shadow of a solid body, then, is the same thing as to find the shadow of a line, namely, the shadow of its dividing line of light and shade.

175. In finding the shadow of a point, also, the only practicable way is first to find the shadow of some line that passes through the point, and then to find in this line of shadow the point of shadow that corresponds to it. This point is easily found by drawing a line, representing the invisible shadow of the point, through the air, from the perspective of the point to the vanishing point of shadows, V^s. Its point of intersection with the visible shadow of the auxiliary line is the shadow of the point in question.

Thus in Fig. 37 the point A has its shadow at *a*, and conversely, the shadow at *b*, at the bottom of the steps, is cast by the point B; this shows just how much of the stick throws its shadow on the ground. In Fig. 34, the shadows of all the principal points, such as the top of the sign-post or of the peak of the gable, are found by drawing lines to V^s, and marking their points of intersection with the shadows of the lines in which these principal points lie.

176. The whole problem of shadows, thus resolves itself into the problem of finding the shadow of a line; and as in this paper we will consider only the case of straight lines throwing their shadows upon plane surfaces, we have to do only with rectilinear shadows, lying where the plane of the invisible shadow cuts the plane of the surface that receives it. The whole question becomes, then, simply a question of the intersection of planes.

177. Now the line of intersection of two planes, as we have seen in the case of two intersecting roof planes, has its vanishing point at the intersection of the traces or horizons of those planes. (34.) Hence the (visible) shadow of a line upon a given plane will have its vanishing point at the intersection of the trace of that plane with the trace of the plane of the (invisible) shadow of the line. And since, if any plane is given in perspective, its trace is already known, the only thing that remains to be done is to find the trace of the plane of the shadow. The direction of the line and the direction of the light are of course also given; that is to say, their vanishing points also are known.

178. But these two vanishing points being known, the trace of the invisible plane of the shadow is easy to ascertain. For the trace of a plane passes through the vanishing points of any two lines that lie in it. (13. c.) Now, as may be seen in Fig. 37, the line that casts it lies in the plane of the shadow, and so does the invisible shadow of any point in that line. The trace of the plane of the shadow accordingly passes through the vanishing point of the line that casts it, and through the vanishing point of shadows V^s, and may be found at once by drawing a line through them.

Thus in Fig. 34 the trace of the shadows of the right-hand horizontal lines R, whose vanishing point is V^R, is the line T S R, the trace of the shadow of R, joining V^s and V^R. In the same way, if we call the plane of the shadow of L, S L; that of M, S M; that of Z, S Z; etc., we shall have the traces of these planes T S L, T S M, T S Z, etc., connecting V^s with V^L, V^M, V^Z, etc., respectively. As V^R, the vanishing point of vertical lines, is at an infinite distance in the zenith, T S Z, like T R Z and T L Z, is a vertical line.

179. It is not in general very easy to follow these invisible planes of shadow in imagination, and to see just how they go, by a mere inspection of the figure. But in the case of a vertical line, such as that of the nearest corner of the building, one can see that the plane of the shadow must be a vertical plane nearly parallel with the right-hand side of the house, but not quite so, being at a less angle with the plane of the picture. It seems reasonable, then, to find its trace T S Z parallel with T R Z, and a little further to the right.

180. Since all these planes of shadow have one element parallel to the light, all their traces, as is seen both in Fig. 34 and in Fig. 35, pass through V^s. This point thus furnishes an illustration of the proposition (13. b.) that the traces of all the systems of planes that can be passed through a line, or drawn parallel to it, in any direction, pass through the vanishing point of the system to which the line belongs, and intersect each other at that point.

V^s, accordingly, resembles the centre of a wheel, the spokes of which are drawn through the vanishing points of all the lines in the picture.

181. The intersection of the traces of these planes of shadow with the traces of the different planes on which the shadows fall gives the vanishing points of the different lines of visible shadow. Thus in Fig. 34 the trace of the shadow of the sign-post is T S Z; and the successive portions of its shadow which fall upon the ground R L, upon the side of the house L Z, and upon the roof L M, are directed to the points of intersection of T S Z with T R L, or the horizon, with T L Z, and with T L M, respectively.

Fig. 38 exhibits these relations in a diagram. The vanishing points of shadows are marked in this plate by four letters, thus, V^{s-LM}, which signifies the vanishing point of the shadow of vertical lines falling upon the plane L M. It hardly needs to be pointed out that all the different shadows cast by the lines of any system, on whatever plane they fall, have their vanishing points on the trace of the shadow of that system; and that all the shadows that fall on a plane, whatever kind of line casts them, have their vanishing points in the trace of that plane.

182. The direction of the lines of shadow being thus predetermined by the determination of their vanishing points, and their length being fixed either by the limits of the plane on which they fall or by the limits of the length of the lines that cast them, everything is known about them except their exact position. To fix this it is necessary to know the position of some one point in the line of shadow. This is generally given in the conditions of the problem. In Fig. 34, for example, so much of the shadow of the sign-post as falls on the ground is determined in position by its initial point. The shadow begins where the pole touches the ground. Thence it goes off in the direction of its vanishing point, at the intersection of T S Z with the horizon, as far as the ground extends, that is, to the wall of the house. The terminal point of the shadow on the ground is the initial point of the portion that runs up the wall, and so on.

All the shadows in Fig. 34 and Fig. 35 are drawn in this way, and illustrate these principles. It is not worth while to take space to describe in detail what may now easily be understood from an inspection of the plate.

183. If no convenient spot to begin at is furnished by the conditions, it is necessary to pass an auxiliary line, in any direction that is most convenient, through some point in the given line, and to find the point where it pierces the given plane. This point will be the initial point of the shadow of the auxiliary line; the shadow of the point selected can then be determined upon it, and the shadow of the given line drawn through that point of shadow.

It is generally most convenient to take this auxiliary line in a vertical direction.

184. Fig. 36 illustrates the case in which the sun is neither behind the spectator nor behind the picture, but just in the plane of the picture, throwing his rays parallel to it and to the plane of measures. This is by far the most convenient position for the sun when the objects represented are drawn in angular or two-point perspective, as they generally are. It is almost sure to produce a picturesque disposition of light and shade.

It is also much simpler and easier to work than either of the other cases. For since the vanishing point of shadows is at an infinite distance, V^s is entirely off the paper, and the rays of light cross the paper at their real inclination with the ground; and not only the lines of invisible shadow, but the traces of the planes of shadows, have the same inclination. There is an apparent difficulty in the case of vertical lines, and of other lines parallel to the picture, since their vanishing points, as well as the vanishing point of shadows, are at an infinite distance, and it is impracticable to find the trace of their shadows by drawing a line from one infinitely distant point to another. But it is obvious that these lines must cast their shadows in planes parallel to the picture. The shadow of such a line on any plane, then, will be parallel to the trace of that plane. (80.)

Fig. 36 furnishes abundant illustration of this case.

185. It is not always quite obvious, from mere inspection of a drawing, which of the edges of a solid object really determine the form of its shadow; which of its lines go to make up the dividing line of light and shade (174); which of its surfaces, that is, are turned towards the sun, and which are turned away from it. It is not easy to tell, for example, whether the further slope of a roof is in the light or not; whether the eaves or the ridge is casting a shadow on the ground beyond. Conversely, it is not always easy to judge just where the sun must be put in order to produce the distribution of light and shade upon the different surfaces that is desired.

These difficulties disappear, however, if we consider that what we want to know is whether or not the sun has set, so to speak, to the plane in question, and apply to that plane the same test that we apply to the horizontal plane of the ground. If the sun is above the horizon, or the vanishing point of shadows, opposite the sun, is

below the horizon, we know that the ground is in light, and *vice versa*. So of every other plane: if the sun is above its horizon it is in light; if the sun has set to it, and the vanishing point of shadows is above its horizon or trace, the plane is in shade.

In Fig. 35, for example, V^s is beyond T R Z; it is above the horizon of the plane R Z, the right-hand side of the house. This side of the house is accordingly in the shade: the sun has set to it. If V^s were moved to the other side of T R Z, below this horizon, that side of the house would obviously be in the light. So of R N, the plane of the back of the roof. V^s is above T R N; the sun has set to that plane also, and the dividing line of light and shade runs along the ridge; it is the ridge, not the eaves beyond, that casts a shadow.

186. But it is to be noticed that when the sun set to the end of the house which is in sight it rose to the other end of the house which is parallel to it, and as both these planes have T R Z for their trace we must discriminate between them.

This we can do if we recall the distinction already pointed out between the surfaces that are in sight and those that are not: "A plane surface upon a solid object cannot be seen unless it is on the side of the object next the trace of the plane" (12); that is to say unless it is below its horizon. (38.)

187. Bearing this in mind, we have the following rule for the illumination of surfaces by the sun: —

A plane surface that is in sight, being turned towards its trace, is in the light if the sun is on the farther side of its trace, or if the vanishing point of shadows is on the hither side, and *vice versa*.

A plane surface that is out of sight is in the light if the sun is on the hither side of its trace, or the vanishing point of shadows on the further side, and *vice versa*.

188. It has not seemed worth while to encumber the figures with constructive lines and their application. It is for the most part left to the intelligence of the reader to trace, point by point, the application of these principles in the various cases they present. In Fig. 35, however, a notation has been used for the outline of some of the principal shadows which will serve both to recall the principle of their construction and to indicate the point to which they are directed. The expression "S Z on R L" for instance, indicates that the outline to which it is attached is the shadow of a vertical line Z, on a horizontal plane, R L; "S N on L M," in like manner, when applied to the shadow upon the upper roof of the iron rod which supports the chimney, signifies the shadow of a line N upon the plane L M. In both cases the line of shadow is a line of intersection of two planes, and has its vanishing point at the intersection of their traces; in the former case at $V^{s.\,z.}$, where T S Z intersects with T R L, in the latter case at $V^{s.\,n.}$, where T S N meets T L M.

189. In a few cases the lines of invisible shadow have been indicated, converging to V^s, to show their use in determining the length of the visible shadow. In Fig. 34, where this is done, it will be noticed that the dotted lines drawn from the top of the posts converge at the sun, while their shadows converge to the point on the horizon below the sun. In Fig. 36, the visible shadows are parallel and horizontal, while the dotted lines that indicate the invisible shadows follow the real direction of the light, falling parallel to the picture, and are parallel to each other and also to all the traces of shadows drawn through the various vanishing points.

190. It will be observed that wherever a line is parallel to the plane on which it casts its shadow it is an element of both systems of planes; the traces of both planes accordingly pass through its vanishing point (13, h.), which is their point of intersection, and the shadow is parallel to the line that casts it, as it should be.

OLD HOUSES MADE NEW.

MR. WOOLLETT'S little book, "Old Houses Made New,"[1] is an interesting collection of designs for the alteration of old country houses, a branch of architectural practice which engages, or ought to engage, the best invention, judgment, and good taste of the architect. As an old house is, *primâ facie*, better than a new one, so an old house which is worth altering may be presumed to have some character and merits of its own which are worth preserving. To effect the changes desired without insulting the original, to add the picturesque or decorative features without overstepping the modesty of nature, to steer clear of the rock of pretension on the one hand and of awkward newness on the other, is a task requiring the careful exercise of a trained experience and a ripe judgment.

We cannot say that Mr. Woollett has in every case quite successfully avoided the dangers we have alluded to. In some instances, indeed, one or another of them has visibly got the better of him. Thus the last example in the book raises the suspicion that the new house has lost the simple, homely grace of the old without gaining, at least on the exterior, any compensating beauties. In most of the cases illustrated, Mr. Woollett was fortunate in having houses to deal with which made no appeal on the score of original grace or character, and he may be easily forgiven for taking small care to preserve the old features or expression, — or, to use his own words, for "changing the exterior so as to blot out all remembrance of the original dwelling."

Mr. Woollett's most successful attempt seems to us to be that illustrated in plates 8, 9, and 10, where both the interior arrangement and the exterior design are managed with much skill and good taste. His interiors are not altogether satisfactory, being almost all too ambitious for the houses to which they belong; and it is singular to observe that while he expresses great admiration for the "simple and beautiful spirit" of the colonial style, so called, he has in his work, so far as it is set forth in this book, given no example of its use.

[1] Old Houses made New. By William M. Woollett, F. A. I. A. New York: A. J. Bicknell & Co. 1878.

CORRESPONDENCE.

THE BANK OF NOVA SCOTIA BUILDING. — THE SAVINGS BANK BUILDING.

ST. JOHN, N. B.

THE new building of the Bank of Nova Scotia is the first stone-fronted building (one warehouse excepted) which has been built in St. John since the fire. It is about thirty-eight feet in width, three stories high, and has a slated Mansard roof with the galvanized-iron semblance of three stone dormers. There are two front entrances, each emphasized by projecting porticos with polished columns of gray granite. It would be a difficult matter to decide whether the classic or the Gothic style preponderates in the design. The columns, bases, and entablatures of the porticos, for instance, are classic in both form and proportion, while the capitals are Gothic in outline, and are crowded with the most florid carving of interlaced foliage, beast, and bird. The cost of the structure is about $25,000. Mr. Samuel Brookfield, of Halifax, is the builder, and I am informed he also prepared the working drawings. A sketch, furnished by Mr. Dewar, was the only architectural assistance asked for by the directors.

Next southward of the Bank of Nova Scotia a fine building belonging to the Bayard estate is nearly completed. This is the first building here in which the principal floor has been kept high above the street grade, to admit of the basement being used for offices. This work is in charge of Mr. H. T. Starbuck, architect, who is to be congratulated on the success of his arrangements.

Tenders are now being invited by the Dominion government for the rebuilding of the Savings Bank. The new building is to occupy the site of the old one, destroyed by the fire, and except in the addition of an attic story will be nearly an exact reproduction of it. It will have a frontage of fifty feet on Canterbury Street, and of forty feet on Princess; it will be three stories high with basement. The front walls will be faced with freestone ashlar. The other walls and the principal partitions will be of brick. The roof will be flat, and covered with Warren's patent asphalt felt and gravel roofing. The style of the design is classic; a plinth or base is carried up to the level of the principal floor; above this is a dado 3 ft. 6 in. high, with projections at intervals forming pedestals for the Corinthian pilasters, which extend through two stories to the main cornice at the level of the third floor. Above the main cornice is an attic story with smaller pilasters, cornice, and parapet. The longest front is relieved by increased projection of the central pairs of pilasters, the break being carried up through the cornices, and finishing in a broad panelled and moulded chimney top. The interior of this building is arranged for the banking offices on the principal floor; offices for the Dominion treasurer and auditor on the second and third floors; and janitor's living rooms, boiler, fuel, etc., in the basement. The large fire-proof vaults of the old building having remained uninjured will with new doors be made to answer for the new structure. The floors throughout the building will be timbered with spruce joists, as usual here, but will be protected against fire by iron and plaster ceilings; and care is to be taken to fill the spaces between the furrings at intervals, so that no flues will be formed to carry accidental fire from one part of the building to another. The drawings have been prepared by Messrs. McKean and Fairweather, architects, under instructions from the Department of Public Works, and are now open to contractors at the offices of that firm.

With the exception of the public buildings, churches, etc., very little is being done in the way of building. The sites of many of our finest residences are still heaps of ruins, and the better class of dwellings will, I fear, be replaced but slowly. Many good tenement houses have been put up, and promise to bring in good returns; they are as a rule a vast improvement on the buildings of their class of former times.

Several new firms of architects have opened offices here this spring. Nearly all the assistants of any ability who were dismissed last fall have gone into business on their own account, and the consequent facility with which any number of sketches may be had for no other consideration than the giving their producers the chance of a job will not tend to raise the profession in the esteem of the public.

VERAX.

A NOVEL HYDRAULIC PRESS. — A curious accident took place in Providence, R. I., on the first of May, when near the middle of the morning the occupants of an office in the basement of the Wilcox building were surprised to see the floor of the room slowly rising at its middle to a height of some eighteen inches. Suggestions that the walls were settling, that it was the effect of an earthquake or of the rising tide, proved foundationless. It was at length discovered that a small leak had opened in a six-inch water main that passed under the building, and the escaping water had found in the four walls of the building a cylinder, as it were, from which it could not escape, and in the fourteen-inch-thick layer of concrete a piston head.

NOTES AND CLIPPINGS.

Protecting Theatres from Fire.—Mr. C. J. Phipps, F. S. A., who has built or remodelled some twenty or more theatres, says that in cases where the proscenium-wall is not of brick, it may be made to a certain degree fire-proof, or rather fire-resisting, by covering it to the thickness of one and a half inches with a composition made of plaster of Paris and coke breeze, or broken and ground burned bricks, which can be applied at a cost of about a dollar a square yard. This coating will, it is thought, withstand the fire for some ten or fifteen minutes.

A Large Blast.—A successful blast was made at the quarry of Mr. F. J. Fuller, at West Quincy, Mass., on April 12th. About a year ago it became necessary to enlarge the quarry towards the south about one hundred feet. The vein or layer of granite in the new pit was separated from the old quarry by a mass of seamy rock about twenty feet in thickness, and as the new opening was then about forty feet deep, it became necessary to get this mass of rock out of the way. To do this with the least expense two holes three inches in diameter and ten feet deep were drilled into this seamy rock five feet apart. These holes were charged each with five pounds of Dualin and exploded by electricity for the purpose of making a seam for powder. This being successfully accomplished, eleven kegs of powder were put into the seam and exploded, causing the whole mass of rock to be lifted from its bed and thrown into the old quarry, about forty feet below. The mass of rock moved contained about thirty thousand cubic feet, or more than two thousand tons.

Foreign Strikes.—The cotton strikers in England have already shown signs that they are willing to become rioters, and have, as at Darwen, given the police a hard fight before they could be quieted. We may yet hear of such riots as have lately taken place in Christiania, Norway, where, because the manufacturers had given notice that they were about to reduce the wages of the operatives, a mob of some five thousand men and women besieged the house of one of the leading manufacturers on April 14, and when the police interfered drove them off with showers of paving-stones. A detachment of cavalry was treated in the same way, and the mob dispersed at midnight, only to assemble again in the morning, when, as the cavalry proved ineffective, a half battery of artillery and two companies of infantry were sent to their assistance. There seems to have been little firing done, and consequently there were but few fatal injuries. It is rather subversive of the accepted notion of the merits of the two arms of the military service to find that it was the charging of the infantry with fixed bayonets that routed the rioters, against whom the cavalry, though using their swords freely, were unable to make headway.

The Shakespeare Memorial Theatre.—The new theatre at Stratford-on-Avon is making rapid progress, and the foundations are being laid for the new museum, library, and picture gallery, all to be devoted to Shakespearian objects. Henry Graves, the art publisher on Pall-Mall, has announced that he has by will bequeathed all his pictures of a Shakespearian character to this gallery. The stained-glass window given by the Americans to the town of Stratford, illustrative of the Seven Ages of Man, is now nearly completed. It is in the Church of the Holy Trinity, and immediately opposite the spot where the remains of the poet lie.

A Galvano-Plastic Statue.—The Electro-Metallurgical Company of Brussels has lately completed a colossal statue of Jan van Eyck, modelled by the Belgian sculptor Fickery, in bronze, by the system of electric deposition. The galvanic process occupied several months, although a thickness of but six to eight millimetres (about one quarter of an inch) was attained. It is believed to be the largest article which has been produced by this method, being over twelve feet in height, and is regarded as a much more perfect imitation of the model than could be obtained by casting.

Cremation.—In Italy, at least, the rite of cremation bids fair to supersede any other mode of disposing of the bodies of the dead. A Cremation Society at Milan has been an incorporated body for some time, but until within a year it has been necessary to obtain the special permission of the Minister of the Interior before a body could be burned. Now, however, any prefect of a province may grant a permit, provided the relatives of the deceased and the Cremation Society make a joint petition for it.

Dr. Le Plongeon's Troubles with the Mexican Government.—Dr. Schliemann's troubles with the Turkish government, while pursuing his investigations on the site of Troy, find a parallel in the case of Dr. Le Plongeon, whose researches in Central America have already proved of remarkable interest and value. A confidential executive document has been placed before the Senate, in which Dr. Le Plongeon appeals to the United States government for protection while pursuing his archæological researches. It appears that the Mexican government has already despoiled the explorer of some of the fruits of his toil in that it has seized the fine statue of Chaacmol, which was discovered in the ruins of the ancient city Chichen-Itza. Dr. Le Plongeon, like Dr. Schliemann, is accompanied and assisted by his wife.

New Docks on the Clyde.—Mention has been made more than once to the size of the docks in London and Liverpool, and to them the new docks on the Clyde may be compared favorably. One of these docks, which will have cost about eight million dollars, has a water surface of some thirty-four acres, and a depth of water of twenty feet.

Deposits in Steam Generators.—Analysis has shown that the tubercular deposits formed in steam generators and reheaters consist of fatty matters that had become oxidized. The acid can, therefore, be neutralized by an alkali, and milk of lime is recommended as a most economical agent, which will prove very effective in preventing the dangerous deposits.

Strikes.—It is said that there were one hundred and ninety-one strikes in England, during the year 1877.

A Long Cannon Range.—The range at Dülmen, in Westphalia, belonging to Herr Krupp's establishment, having become too short for the satisfactory conduct of experiments with the heavy and long range ordnance now manufactured there, a larger piece of ground has been recently converted into a range at Meppen. The old range was 7 kilometres long; the new one is 17 kilometres in length, and can, if necessary, be yet further extended. It is, therefore, the longest range in existence, and will suffice for the trial of the largest guns at present made. The ground runs from south southwest in a north northeasterly direction, nearly parallel to the Westphalian Railway, beginning near the station of Meppen, and extending past the Kellerberg to the Esthern station. The first piece of ordnance fired on the new range was a 15 centimetre siege-gun, weighing 3,000 kilogrammes. With a charge of 6.5 kilogrammes of prismatic powder and a shell weighing 31 kilogrammes, including a bursting charge of 2.3 kilogrammes, an initial velocity of 473 metres and a range of 10,000 metres was obtained, the time of flight being 42 seconds. Excellent practice is reported to have been made, all the shells bursting close to the target. As soon as the necessary railroads and buildings have been constructed, further experiments are to be made on the range with a 35.5 centimetre and a 40 centimetre gun.

Large Iron Roof.—The gas-works at the Grasbrook at Hamburg have recently been covered with a gigantic iron roof, constructed by the Essener Union. Its weight is 113,300 pounds and its length 273 feet. With the exception of the roof on the Liverpool gas-works, it is the largest gas-works roof in Europe.

M. Viollet-le-Duc on the Exhibition Buildings.—It is said that M. Viollet-le-Duc, the eminent architect and historian, is to contribute a series of articles to the French review, *L'Art*, on the buildings in which the Paris Exhibition is held. They will be richly illustrated with etchings and sketches.

The Oracle at Dodona.—We have given accounts of the discoveries of the oracle of Dodona (see vol. ii., pp. 186, 220), and think that the following from the Philadelphia *Press* will also prove interesting: M. Carapanos, who was the first to determine the site of the celebrated Temple of Jupiter at Dodona in Epirus, considered to be the oldest in Greece, has just published an account of some of the results which he has obtained in his explorations. Besides statues, utensils, arms, and coins, he has recovered a considerable number of leaden plates on which are inscribed the questions addressed to the Deity. Some of them are merely curious, whereas others concern the general or local history of Greece. One has the commencement of an interrogation put by the city of Tarentum, but unfortunately it is incomplete; another asks for advice as to the policy to be pursued under certain specified circumstances, by a people living near Molossis; on a third, the Corcyreans (Corfu) inquire as to the sacrifices necessary to establish concord among them. In others, a woman asks for the means of curing a disease; Apis wishes to know whether his missing blankets and pillows are lost to him forever; a shepherd seeks for information as to whether a certain bargain offered him in reference to his flock would be to his interest if he accepted it. On some of the plates the answers are inscribed, and no one will be astonished to learn that they are obscure, or, rather, impenetrable. In some the word "truth" appears, and in many others that of "confidence," no doubt referring to the trust demanded by the oracle. The formula of interrogation is frequently preceded by the dedication: "To the God of Good Fortune." M. Carapanos does not admit, as has been generally believed by antiquarians, that the sanctuary and the rites practised there were of Egyptian origin; and in the account given by Herodotus he sees nothing more than a testimony of the ancient relations existing between the valley of the Nile and the Pelasgico-Hellenic oracle of Epirus.

An Ancient Bronze Foundry.—At Cagli, the Roman Calli, in Italy, a number of bronzes have been discovered lately, and some of them show such evident traces of never having been finished that it is supposed that a bronze foundry was once established at the site. What tends to confirm this inference is that in the same place a number of terra-cotta vessels were found, such as are used by founders.

Architects as Witnesses.—The behavior of architects in the witness-box is a thing that very much requires to be regulated by etiquette. It is quite common for three or four gentlemen on one side, and three or four on the other, to contradict each other so flatly that the judges feel compelled to comment upon it, even after counsel may have said quite as much as they dare. That such contradiction is also frequently considered to be as devoid of scientific intelligence as of personal good taste is not too much to say. Medical men, no doubt, may be said to contradict each other not a little to order, but etiquette, at least, keeps their differences of opinion within limits. Architects, on the contrary, would seem to be so glad sometimes to earn a few guineas, and, so elevated by the honor of a solicitor's retainer, that their opinions cease to have any value whatever. Especially when the case of dispute happens to affect, as it frequently must, the personal interests of a brother practitioner, if it be only in respect of his work, etiquette, we need scarcely say, ought certainly to govern very strictly.—*The Architect.*

A Cement for Wood.—It is said that a cement for wood vessels required to be watertight may be formed by a mixture of lime-clay and oxide of iron, separately calcined and reduced to fine powder, then intimately mixed, left in a close vessel, and mixed with the requisite quantity of water at the moment when ready to be used.

Solar Photography.—M. Janssen is acquiring new and valuable knowledge relative to the structure of the sun's disk, by means of large images and brief photographic exposures. He is thus enabled to neutralize the effects of irradiation. By means of a special and very perfect mechanism, he has reduced the time of exposure to *one three thousandth* of a second, obtaining sharply-defined images corresponding to disks of more than a meter in diameter.—*Comptes Rendus.*

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THE very delicate and difficult operation of straightening the walls of St. Alban's Abbey Church, in England, which was undertaken by Sir Gilbert Scott not long before his death, was begun a few days ago, says the *Builder*, with every promise of success. The walls of the nave — which is the longest nave in England, being not very far from three hundred feet — have so spread as to obviously endanger the building, and to make it imperative that in restoring it or even in preserving it, for the uses of a cathedral, to which, we believe, it is to be raised, they should be brought back to the vertical. This seemed a hazardous task, for the walls are some seventy feet high and seven thick, divided as usual into main arcade, triforium, and clerestory; and the south wall, which was most out, leaned twenty-seven inches outwards over the aisle. The masonry, moreover, was a good deal weakened by age, having crumbled more or less from long neglect and exposure, and the piers were thought to be none too heavy for the weight they had to carry. The roof, of course, is of timber, or it would have been impossible to bring the walls back to their places. The method used was this: the main effort being to straighten the south wall, a horizontal truss was set in the clerestory, running the length of the nave, or of that part of it known as Trumpington's work, which had deflected, to serve as a guide up against which the wall was to be forced into place. A sloping bed of concrete was laid against the inside footing of the south aisle wall, to serve as abutment for the shores or struts that were to bear against the nave wall, and on this concrete was bedded a continuous sill or "template." Upon this were set the feet of the shores, which were framed of struts radiating in a vertical plane, like flying buttresses spreading at the top, and bearing at the upper ends against upright wall-pieces, to distribute the pressure through the height of the wall. The shores were in two sets, one bearing against the upper part of the wall and the other against the lower part. The north wall of the nave was buttressed in like manner on the inside by shores resting on concrete footings at the base of the south piers, to sustain it against the tension of horizontal rods, which were carried through the south wall at the level of the clerestory, to be used in drawing the walls together, that is, in drawing the south wall up to the north. Small hydraulic presses were interposed between the feet of the shores of the south wall and the sill against which they bore. Since it had settled outward, to bring it back to its position would have involved lifting the whole mass bodily, more or less, as it turned about a horizontal axis or axes in its inner face. To avoid this difficulty the bold expedient was adopted of sawkerfing the piers nearly half through on the inner face below their base, and the walls below the triforium, so that the masonry should settle on the inside, as it came into position, instead of being lifted on the outside.

AT the time of writing the article in the *Builder*, the process had begun, and the wall was moved safely ten inches toward the vertical, the hydraulic presses working and the rods in the clere-story being screwed up simultaneously. The operation required extreme caution, and the pressure was applied so as first to bring the main piers into position, after which the upper part of the wall was to be raised to the vertical by further effort. The masonry cracked somewhat and opened at the joints under the strain, chiefly on the outside, but there was every indication that it could be restored to its proper position without serious injury, and that this reparation, perhaps the most difficult that has been undertaken since the renewal of the piers of the Pantheon at Paris, by Rondelet, would be securely accomplished. It is said that only a few days before his death Sir Gilbert visited the church, and spent a whole day in examining the traces of the early English work, which had been displaced or covered up by the porch added to the west front at a late date, and declared that he had found all the details that were needed to restore the front completely, saying: "It is one of the finest things ever done, and we will do it again."

THE Chicago Academy of Design has been lately reorganized, after a season of rather unsuccessful struggle with losses and the difficulties of hard times, in a way which, it is hoped, will restore its former prosperity. Originally chartered in 1869, it was started with great spirit, and for a year or two had great pecuniary success. But like many other things in Chicago it has never fully recovered from the shock of the great fire of 1871. While modestly housed on Michigan Avenue after the fire, it still held its own fairly till, in 1876, it was moved to more expensive quarters in the building leased for it on the corner of Monroe and State streets. Here the pressure of hard times came upon it, and it had fallen into embarrassment, being preserved from disaster only by the guaranty of persons who have eked out its revenue from their private purses. Lately a vigorous effort has been made to put it on a sounder footing. Its constitution was revised last autumn, putting the whole control of it into the hands of a board of trustees appointed for a long term, of whom the president is Mr. James H. Dole, and the secretary Mr. W. M. R. French. The school of drawing and painting, which, in spite of discouragement, has been perseveringly kept up, is to be reorganized with the help of private subscription. It will begin the next year with a better arranged course, and with better appliances for instruction. Mr. Spread, who has latterly had charge of the school, will remain as professor of drawing and painting; Mr. L. C. Earle will have the care of the life classes; and lectures are promised from Mr. French and from Mr. W. L. B. Jenney. The instruction as at present arranged is confined to drawing from casts from the antique and from life, and painting in oil and water colors; but it is part of the plan to add a school of industrial art and design. There are now some forty pupils in the school, with a life class three evenings in the week.

AT the same time the Illinois Industrial University is proposing to hold in Chicago a summer session for classes in iron-working and wood-working. A part of the Exposition Building has been allowed it for this purpose. There will be two classes in each kind of work, limited for the sake of supervision to twelve pupils each, in session three hours of every working-day, one in the morning and the other in the afternoon. This admits of forty-eight pupils, who will have one hundred and forty-four hours of instruction and practice during the term of eight weeks. The University has been doing this kind of work since its establishment in 1868; the main object of the course of this summer in Chicago is to show conspicuously the kind and the value of the system of instruction which it has developed. The pupils will be taught the handling of tools, by making simple things, such as are actually made in shops for working iron and wood. Each object will be drawn to scale, and the whole class set to make it from the drawing, working simultaneously under instruction at the same object, with a definite allowance of time.

IN the month of April, 1877, an act of incorporation was passed by the State Legislature in favor of the Rhode Island School of Design, which, up to the present time, has remained

but a name. The *causa causans* of its existence was certain surplus moneys presented by the Women's Centennial Commission for the establishment of such a school. As this sum was only sufficient to cover the expenses of a School of Art for one year at most, the incorporators have wisely not undertaken to open such a school. They have declined the overtures made to them by the Christian Association, which had raised a small sum for the purpose of supporting certain classes in art, and made approaches to the directors with the hope of consolidating both the embryonic schools, and so assuring their common growth. This proposition was not acceded to, because the directors felt that it would be for the best interests of their school that it should be absolutely free from the influence of any religious organization. It is now said that if five hundred persons will subscribe three dollars apiece, this sum, with the capital already in hand, will make it possible to open the school in October. It is said, too, that a gentleman has offered to be one of twenty-five to give ten thousand dollars apiece, to establish such a school as ought to be in a city where, engaged in the manufacture of jewelry alone, there are upwards of one hundred and forty establishments.

It is difficult to know whether London or New York is to be accounted the paradise of the speculative builder. First we hear of houses in London, built of ashy concrete or of brick-work laid in street mortar, crumbling down before the contractors can get them fairly off their hands; and then of warehouses in New York falling into ruin as soon as a heavy stock of goods is placed in them. One week we read of a brand-new building on a fine London thoroughfare tumbling in a heap into its own cellar as soon as its roof is on; the next we are told of the preparations of the New York Buddensicks to poison families at wholesale by turning the gas from the street sewers into their houses. The latest story comes from London. Under the present building acts the Metropolitan Board of Works, to which, as we understand it, their execution is intrusted, has power to compel builders to put in suitable foundations, but its authority in this is limited to the substructure of the walls and piers; it has no power to compel a suitable condition of the ground on which a building is to be put. Finding the need of wider authority to check the reckless habit of building in unwholesome situations, the board has appealed to Parliament for power to control the condition of building sites. The Parliamentary Committee, appointed to consider the application of the Board of Works and the objections of builders, has taken a large amount of testimony as to the practices which prevail. The testimony has been printed in a blue-book, and gives the impression of an unsavoriness which, we should say, it would try the mettle of the New York builders to surpass.

It is the common habit to consider a clay foundation much less wholesome than one of gravel; but it would appear that in London he was fortunate who found a new house built for him upon the clay, for he might assume that this at least was no worse than nature made it, while if the ground were gravel there was no knowing what dismal change it might have undergone. In London gravel is far too precious to be left to rest undisturbed in the bowels of the harmless earth. It is the habit, therefore, to dig it out to the depth of seven or eight feet, and the holes it leaves are convenient places into which to shoot the sweepings of the streets. It is said that the whole parish of Battersea has in this way been dug out and refilled within a few years; and other parts of London are as badly off. Some of the tracts are used as dust-shoots, where the dry rubbish and dirt which is taken up from the streets is thrown down. Others are slop-shoots, where liquid refuse and garbage are accumulated. The description of one of those, given by one of the health officers, is sufficient. It was a space about two hundred feet square, "was built up at the sides to a considerable height by means of paving-stones, so that the liquid matter thrown into it should not escape from it, and this was filled up to a height of some six feet with what is called slop from the streets. At that time vegetable refuse, decaying animal matter, dead cats and dogs, fish cuttings, entrails of fowls, and every available filth was thrown into this mass." This was done, of course, by the parish authorities. After due time allowed for fermentation and solidification the mass was carted off, "and I do know," says the health officer, "that it was used to form the foundation of houses in the neighboring parish."

We can easily believe what we are told of the result of this proceeding. In Hackney Wick, for instance, the annual death-rate of the whole suburb being seventeen or eighteen in a thousand, it was found that on one area of about ten acres the death-rate was thirty-four or thirty-five. It turned out that here the houses had been built on a dust-shoot. In one part of the parish of Marylebone there were continual outbreaks of epidemics, for which no reason could be assigned, until the health officer discovered that the houses had been built on a foundation of animal and vegetable refuse. In a neighboring parish the building of a group of houses over an old slop-shoot was followed, as soon as the houses were occupied, by a severe outbreak of scarlatina. In other cases houses were built over old cesspools, which, instead of being cleared out according to law and filled with clean material, were simply covered with a layer of brick and plaster permeable to gases. The effectiveness of reasonable precautions was singularly shown in the case of another block of houses in Hackney Wick. These, like those before mentioned, had been built on a dust-shoot, but the health officer, though without authority to require it, had prevailed on the builder to cover the whole area of them with a layer of cement concrete, and in these houses the death-rate was small for the neighborhood, with no zymotic diseases. It is not to be hastily inferred, nevertheless, that it is safe to build on foul land, and trust to concreting cellar floors; for an unwholesome soil will make an unhealthy neighborhood, and within the houses themselves the concrete is liable to crack from any settlement, — is sure to unless solidly laid, — and give an escape into the houses for the gases imprisoned in the soil.

The attitude of the cotton operatives in Lancashire is still threatening. The first disorders were repressed by military force after the burning of a few houses and mills, but while we write the discontent is represented as increasing. The masters steadily refuse to change their terms; the lock-out therefore continues, and as the work-people grow more excited an outbreak of great violence is feared. It has been said that the rioting at Blackburn was not done by the operatives, but by a mob of ruffians, who took advantage of the disturbances to break loose from control, and do violence in their name. This may be true; but it is none the more reassuring. The men who are ready at any time to stir up disorders which they cannot control are as dangerous to the public as the uncontrolled mob itself. We presume that a great part of the Socialists of this country are of this kind, as well as the workingmen who lend their name to them. The fondness for drilling among the Communists and the itching of their fingers to get hold of the musket are not to be regarded as innocent. There are indications, fortunately, that in this country the eyes of people are being opened to this danger. The deposition of Kearney from the presidency of the workingmen's party in San Francisco is one of them. He has set up an organization of his own, it is said; and the associations outside the city are waiting to see which party it will prove more profitable to join. The movement in St. Louis has taken on the dignity of an organization of veterans. At the public meeting on Sunday a call was made for workingmen who had seen military service, either in Europe or in the United States, and some two hundred and fifty were enrolled as soldiers in "the army of workingmen."

THE GOLDSMITHS' WORK AT MYCENÆ. II.

The critical investigation of the art of Mycenæ will be a matter of long study; but one or two obvious facts and suggestions may be noted here. The buttons and flat disks of gold, of which enormous numbers were found, may almost be classed by themselves as ornamentation, being geometrical devices mostly of spirals or convoluted lines disposed on two or three axes, the hexagonal arrangement seeming to be the favorite. The designs are arranged with some skill, with due attention not only to the lines but to the flat surfaces and bands between them, yet are not always attractive. The most common effect is that of a group of angle-worms, or the convolutions of the human brain, symmetrically adjusted. Two patterns in the larger disks, one a cuttle-fish and another a butterfly, both very boldly conventionalized, are the only ones that are not entirely arbitrary. It is difficult to feel sure of the impressions one gets by seeing only the prints of these things, which, though they look faithful, yet fail, as indeed they must, to indicate everything which Dr. Schliemann and other examiners have detected in the originals, — since they are twice removed from

them, being made from photographs. As well as we can judge, there seems to be much inequality and uncertainty in the execution, which is natural enough if for instance, as Dr. Schliemann thinks, the buttons were made over the wooden forms which they enclose, and in which, as he says, the pressure of the tool has imprinted the exact pattern that the thin gold cover shows. The other kind of ornaments, which for convenience we may call swaged, assuming them to have been made in some such way as we have suggested, are quite different from these, being rudely naturalistic in form, and showing no such care or skill in design as the buttons and disks, but looking like a much commoner and cheaper kind of manufacture. The diadems and crowns, on the other hand, the sword belts, and a few of the minor ornaments, including the crosses and flowers found with the women's bodies, unless we are misled by the engravings, are of very much finer workmanship and design than those we have mentioned, the decoration being chiefly of rosettes of Assyrian character, with borders of fine beading and spiral or wave ornament. None of them are duplicated, and they seem to have been wrought by hand. It is difficult to believe that they have been made by the same people, and at the same epoch, as the coarser ornaments, although they are manifestly allied to them in style. None of the work, be it said, will bear comparison with the jewelry of the best periods of antiquity heretofore discovered, or with that which General Di Cesnola found at Curium. There are one or two ornaments so entirely unlike the rest as to reject all kinship with them, such as the bit of gold figured as No. 287, and the tube shown as No. 451. These are entirely composed of flowers with four pointed leaves, like early English dog-teeth flattened, attached to each other by the points of the leaves, the interstices being in the tube at least filled with an inlay of rock crystal. The only parallel to these in ancient work that we can recall is some of the painted ornament on Egyptian mummy-cases. The vessels of gold and silver show as great variety, and on the whole as little relationship to the ornaments of either kind as if they had been a hap-hazard collection from various sources, which perhaps it is not unlikely that they were.

It has been remarked that the representations of animals in the Mycenean remains are much ruder than the purely conventional work. This is clearly true, as it usually is in primitive works. It is also noticeable that such representations are almost entirely lacking in the objects which show the most characteristic decoration, — the buttons and disks, the belts and diadems, sword-hilts and handles of sceptres, — while the rudely swaged ornaments, as we have called them, abound in them. Nevertheless, on some of the gems there are animals, and even human figures, engraved with a good deal of skill and spirit; others of them are rude enough. There is, however, one very surprising exception to the inferiority or mediocrity of this kind of work. That is the head which Dr. Schliemann, in pursuance of his Juno theory, calls a cow's head, but to which all other observers, learned or unlearned, agree in assigning the male sex. It is of silver, with horns of gold and an Assyrian-looking rosette, or as Dr. Schliemann says sun, of the same between them. If we may trust the engravings, — and fortunately this time there are two of them, by different hands, — it is clearly, in spite of the roughness of surface oxidation, a piece of masterly modelling that would be remarkable anywhere. It is impossible to believe that the people who could have produced it would have adorned their royal palaces and tombs with the glittering rubbish among which it was found.

That there are marked differences then in the artistic character of the various objects found by Dr. Schliemann at Mycenæ is obvious. That some of them may have been imitated from others in an inferior age or by inferior workmen is likely enough. The pottery is thought to be less advanced than the metal work. The execution of the carving on the tombstones found above the sepulchres is childish compared with the ornament on the objects found in the sepulchres. It is equally inferior to the sculptured ornament in the treasuries, and to some other fragments of carving both of wood and stone found by Dr. Schliemann. Archæologists are probably right in thinking that the tombs are of a later date than the treasuries, and there is not much doubt that the tombstones are later than the tombs. There is reason to believe that the invasion of the Dorians, in whatever shape it came, crushed out the early arts of Greece, as the Teutonic invasions destroyed those of the Roman Empire. It is possible then that the rude tombstones of Mycenæ were the pious efforts of enfeebled descendants in this time of decadence to renew the memorials, effaced but not forgotten, of their famous ancestors. But it is probable that the deposits in the tombs were of one epoch and their differences in character are to be ascribed to other causes than difference in date. As for the epoch, as we have said, tradition and historical evidence point to but one age of splendor at Mycenæ: that to which the legends of the Trojan war are ascribed. The cause of variation which most naturally suggests itself is the distinction between native and foreign workmanship. There is, we believe, no reason to suppose that gold was found in Greece, but every reason to think it was altogether imported. Unquestionably, the people who inhabited Greece in the heroic age were inferior in art to the peoples of Asia. Pretty much all the objects of luxury which Homer describes, when they were not of divine manufacture, were brought to Greece from foreign countries. The traders of earliest days, — up to the time when the Greeks themselves succeeded them as a maritime people, — who were, as traders commonly are, the leaders also in manufactures and industrial arts, were the Phœnicians, the remains of whose arts have lately been recognized, as their commerce has long been known to have been active, along all the coasts of the Mediterranean. Versatile and eclectic like their successors in influence, the later Greeks, they seem to have united in their art the characteristics of their neighbors on either hand, the Assyrians and the Egyptians, when they did not aim at actual counterfeiting, of which they were fond. Their traffic with the gold mines of Southern Arabia is a matter of tradition. The antiquities of Cyprus, Rhodes, Santorin, and other places on the Mediterranean, and even the discoveries at Nineveh, testify to their wide influence. Not only the arts but even the traders of Phœnicia figure in the verses of Homer.

There is a probability, then, that Mycenæ, like other states, derived the more valued, at least, of her ornaments directly from the Phœnicians, and doubtless the precious material for the rest must have come from the same source. The character of the work is such as to lend also a fair color to this supposition. It is evident that a certain part of it was home-made. The finding of the moulds is inexplicable on any other supposition. The inferiority of the duplicated ornaments in workmanship to the more important ones is in keeping with this. The masks for the faces of the dead, which would naturally have been made between death and burial, must necessarily have been made on the spot. The remarkable rudeness of their workmanship is obvious; it needs no greater contrast than is to be seen between them and the cow's head, or bull's head, which we have described, to mark the distinction between one class of work and another. We have said that the ornaments were invariably of thin gold plate. The masks could hardly have been fashioned in time for a burial unless the plates of which they were made had been kept on hand. Among the treasures of the tombs were pieces of gold plate and crumpled gold foil, some of it much alloyed with silver. From these facts, and from the natural convenience of handling, one might infer that gold was regularly imported into Mycenæ as an article of commerce in the form of plates and sheets rather than in ingots or in dust. It is not impossible that the stone moulds or forms found by Dr. Schliemann were imported also, especially since their materials are not found, we believe, in the region of Mycenæ. Possibly the work of the native goldsmiths was limited to producing, by these and other simple means, imitations more or less rough of the better wrought work which was brought them by the traders. That this use of gold in plates and thin sheets was not native to Mycenæ we know; that it was a Phœnician habit the Bible tells us. The sceptres, scale-beams, sword hilts, and buttons made of wood encased in gold of which we read in Dr. Schliemann's book remind one vividly of the Israelites' ark and its staves, made of shittim wood and overlaid with gold. Of the doors of olive wood which Solomon made for the temple we are told that "he carved upon them carvings of cherubims and palm-trees and open flowers, and overlaid them with gold, and spread gold upon the cherubims and upon the palm-trees." The finely wrought gold and silver cups which were buried with the Mycenæan kings are likely to have had the same parentage as that which Achilles gave as prize for the foot-race at the burial of Patroclus: —

> A bowl beyond comparison,
> Both for the size and workmanship, past all the bowls of earth.
> It held six measures; silver all; but had his special worth
> For workmanship, receiving form from those ingenious men
> Of Sidon. The Phœnicians made choice, and brought it then
> Along the green sea, giving it to Troas.

MODERN PLUMBING. IV.

FAUCETS.

Before describing the different kinds of plumbing apparatus, it will be convenient to have a general conception of the structure of the supply cocks, which, although infinitely various in the forms they assume, depend essentially upon a few simple principles.

The commonest form is the ground-cock (Fig. 1), containing a plug, pierced with a hole which in one position of the handle coincides with the bore of the pipe and lets the water flow, and on turning one quarter round crosses the pipe and cuts off the water. The plug is ground in with emery, so as to fit water-tight, and is slightly tapered, so that the spring at the bottom, which can be tightened by turning the screw in the end of the plug, draws it down closely to its place. This works very well unless the head of water is very great; in that case, the pressure of the water on the side of the plug, twenty or thirty pounds perhaps, together with the necessary friction of the plug in its seat, make it hard to turn.

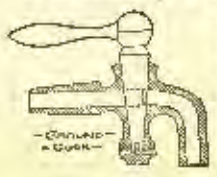


Fig. 1.

The special defect of ground-cocks is that grains of sand or similar hard particles, getting in between the plug and its seat, cut the metal so as to allow the water to leak through, causing a constant dripping; and when this has occurred there is no remedy but to get a new faucet.

In the compression-cocks (Fig. 2) this defect is avoided. There are many varieties, but all consist, in substance, of a tube divided by a diaphragm, the middle of which is horizontal, and is pierced with a hole, which can be closed by screwing down upon it a metal stopper furnished with a leather or rubber washer to insure a tight fit. The screw is worked by a T handle or milled head, or in other ways. The great advantage of these faucets is the ease with which they are repaired. The washer is the only part exposed to wear, if carefully used, and when this gets so worn as to allow the water to leak through nothing is necessary but to unscrew the upper plate by means of a wrench, take out the plunger, and put on a new piece of leather, which is held in place by a small screw through the middle, and then replace the parts. This may be done by any one, even without shutting off the water, if necessary. The washers should be changed as soon as they show signs of wear, by slight leakage; otherwise careless persons, seeing the dripping, will try to check it by screwing the faucet down forcibly, and thus strip or injure the thread of the screw, rendering the faucet worthless.

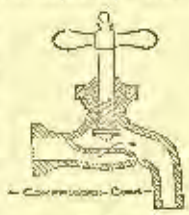


Fig 2.

Compression-cocks differ from ground-cocks in working best under heavy pressures, which tend to lift the valve from its seat, and prevent it from sticking when not frequently used.

Besides these two common forms, the Fuller patent cock (Fig. 3) is much used, the peculiarity of which is the manner in which the water is admitted or shut off by a plug with composition packing, moved to and from its seat in the bore of the tube by an eccentric, which is worked with a lever or T handle like those of other cocks. This is durable and effective; perhaps if it has a fault, it is that the plug, shutting with the action of the water and in the same direction, may, under heavy pressures, close so suddenly as to jar the pipes, when an air chamber is not provided to diminish the shock.

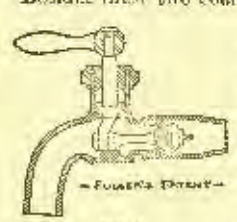


Fig. 3.

Where it is desirable to prevent waste of water, self-closing cocks are used, which shut of themselves by the action of a spring when the handle is released.

A common and serviceable kind is formed by a compression-cock with a screw of so great pitch that it will screw down of itself under the action of a spiral spring coiled about the stem.

Under heavy pressures the shock or "hammering" caused by the sudden shutting off of the water may, with self-closing cocks, be so great as to strain the pipes severely, unless a pattern is chosen in which the spring closes against the action of the water instead of with it; and care is necessary with these to have a spring which shall be neither so weak as to be forced open by any unusual pressure in the pipes, nor so strong as to be unmanageable.

For various purposes special cocks are made, the forms being essentially the same, whether they act as ground-cocks, or by compression, or on the Fuller principle.

For filling tanks or cisterns the supply is generally made to pass through a ball-cock, which consists simply of a faucet with a lever handle twelve or fifteen inches in length, the end of the lever being furnished with a hollow ball of tinned copper, and so fixed on the spindle that when the rising water has floated the ball up to a level with the faucet the water is shut off, precisely as if the lever handle were closed by the hand. Ground ball-cocks are most used, but they are made on the compression and the Fuller principle also. If the ball is large enough, and the spindle oiled occasionally, a ball-cock of any good pattern is little liable to get out of order; but plumbers sometimes carelessly leave them so placed on the spindle that when the lever is horizontal the water is only half or three quarters turned off. The remedy, which any one can apply, is to take the lever off the spindle, by removing the little pin which keeps it on, and replace it in a position a quarter turn below, and then put back the pin which holds it in place.

Next to the ball-cock, the most important cock on the supply pipe is the stop-and-waste, at the point where the pipe from the street enters the cellar wall. This, when turned so as to shut the water off from the house, opens a little orifice in the side, communicating with the house side of the pipe, so that if the pipes are laid as they should be, continually ascending from this point over the house, all the water in the house pipes will drain out through the opening. For this purpose, in the best work, a small sink with trapped outlet to the drain is placed beneath the cock. In common work, nothing more is done than to dig out a hole in the cellar floor beneath it, and trust to the water soaking away. The stop-and-waste cocks and all other stop-cocks on a line of pipe should always be of brass. They are sometimes put in of iron, on account of their being seldom used and generally placed in dark or unfrequented positions where a little economy will not be detected: but the iron, for that very reason, rusts into its place, so as to be immovable when its service is most needed.

Of the different forms of apparatus, nearly every one, wash-basin, pantry-sink, wash-tray, bath-tub, and kitchen-sink, has its special pattern of faucet, possessing some peculiar convenience.

For wash-basins the swing-cocks, which open as they are swung over the bowl, and close on being pushed back out of the way, are convenient, and very generally used. They are liable to the defects of other ground-cocks, so that compression basin-cocks are preferred by many plumbers. These are similar in shape, but the spout is fixed in its position over the bowl, and the water is turned on by a lever or T handle.

The Fuller cocks resemble the compression.

Self-closing basin-cocks are much used, and are made in all varieties. These are usually one half inch, while ordinary basin-cocks are almost always three eighths.

For pantry-sinks it is the rule to use a tall, upright faucet for filling pitchers and flushing dishes, turning over at the top, so as to be out of the way of the dishes; and it is generally specified that the cold-water pantry-cock shall have a screw for attaching a filter.

Wash trays and bath-tubs, besides kitchen-sinks, are supplied through bibb-cocks; that is, a short cock with the end turned down, so as to deliver the water nearly vertically, in distinction from cocks which check the flow of the water in a pipe without changing its direction.

Wash-tray bibbs are made to throw the water forward of the vertical, so as to reach the middle of the tray, and the handle is put at the side instead of on top.

Bath bibbs are arranged to project as little over the tub as possible, and deliver the water close to the edge of the tub. They are often arranged with two handles and one outlet, so that the hot and cold water will be mixed before they enter the tub.

For kitchen-sinks, the ordinary bibb-cock is used, either plain or with flange and thimble.

The plain bibbs end in a tapering portion, which may either have a screw thread to screw into an iron or brass pipe, or be tinned to facilitate soldering to a lead pipe: in either case the pipe, and the junction of the cock to it, being exposed to view.

With the flange-and-thimble variety, a board is set up over the sink or wash-tray, at a little distance in front of the pipes, and concealing them. The end of the faucet extends through a hole cut in this board and is joined to the pipe behind, and the flange covers the hole in the board neatly.

The proper joining of the flange-and-thimble cocks behind the upright board is more difficult, and the superior neatness of the work is not generally of much value.

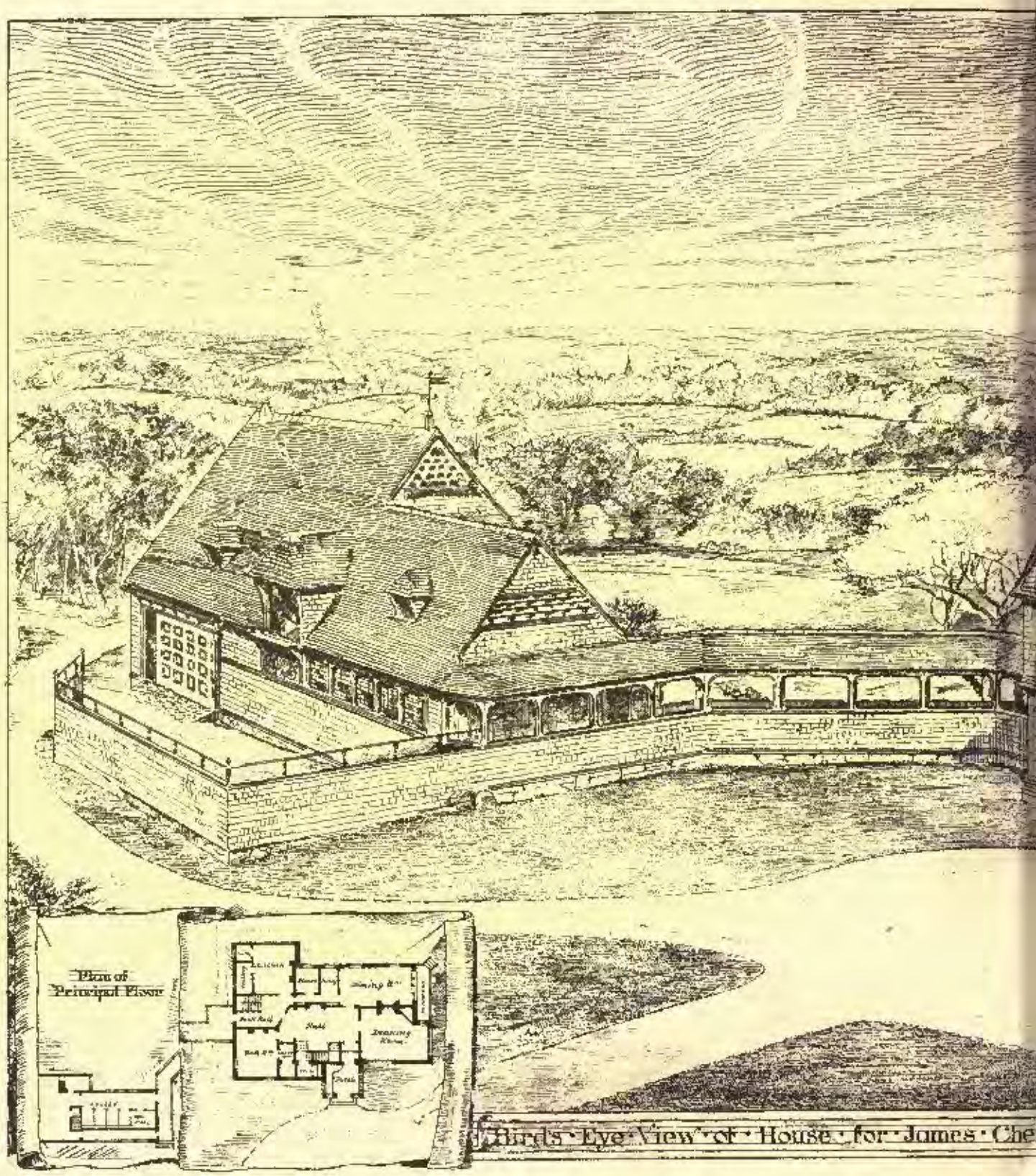
Very elaborate combinations of faucets are often made, as, for instance, basin-cocks with four levers, two of which deliver hot and cold water into the bowl through a single outlet, and the other two supply a small hose or shampoo cock, furnished with a plated rose. These are rather more suitable for barbers' shops, but are also arranged for private houses, and fitted with gold-lined soap cups, hooks for rings, racks for brushes, and so on.

There is a point to be observed in regard to all double cocks, whether for sinks, baths, or basins, which deliver both hot and cold water through the same outlet: if the pressure of the two supplies is very different, as for instance if the cold water is taken directly from the street supply under considerable head, while the hot water comes from a boiler supplied from a tank just above the faucet, the supply under the stronger pressure is apt to drive back the weaker, and force itself out alone, so that it is necessary to draw the hot and cold water alternately, instead of together.

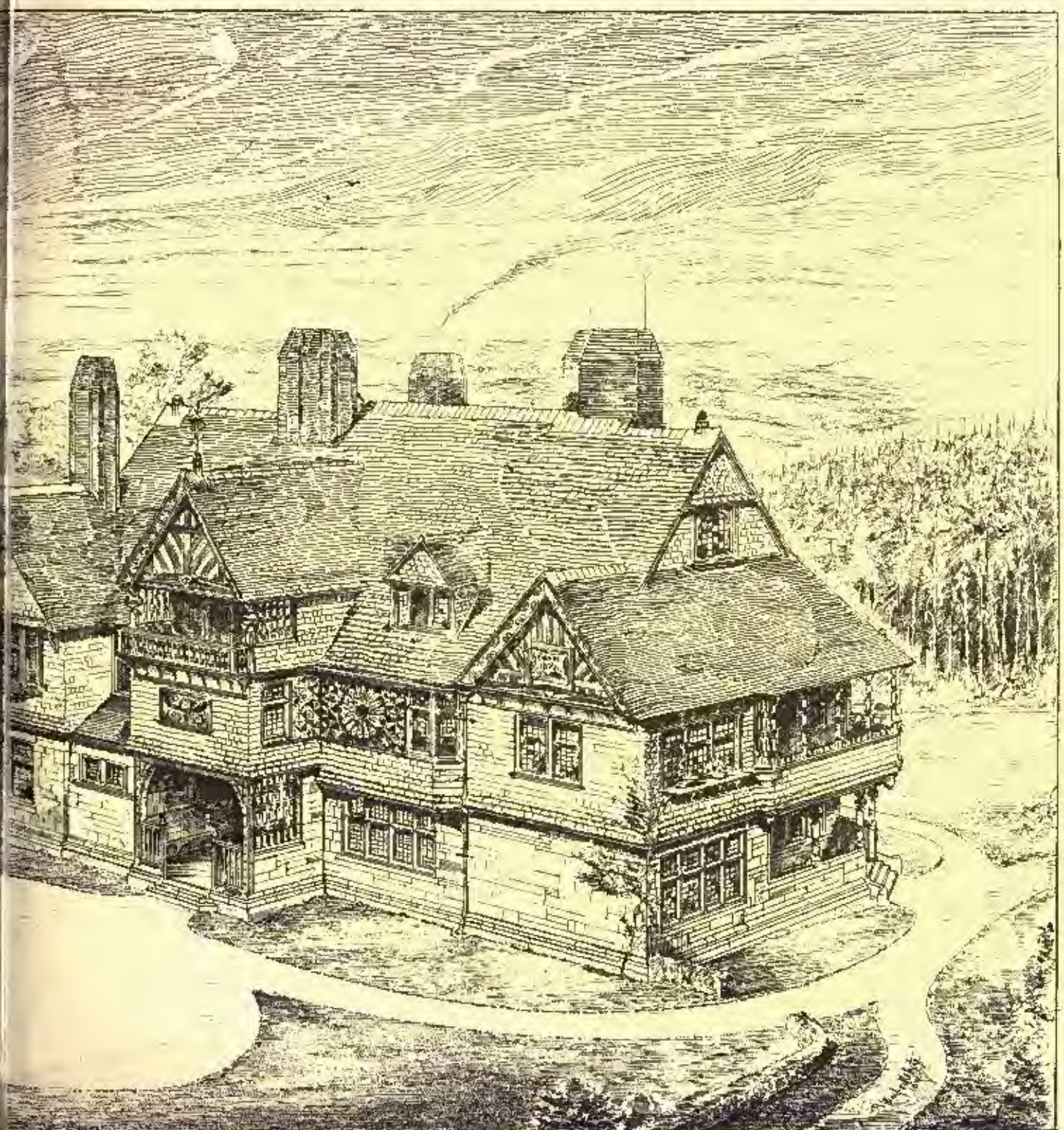
Baths are often fitted with separate hot and cold supply, entering side by side at the bottom of the tub, under a fan, or water spreader, and worked by cocks above the tub, with long spindles extending down to the pipes. This arrangement mixes the hot and cold water perfectly, and the quantity of each is regulated independently of the other.

Some other devices for supplying the water can best be described with the particular apparatus to which they are attached.

— DESIGNS FOR A WALL DECORATION —
— COMPETITION No 3 —



Bird's Eye View of House for James Che



South Manchester Conn. Gombrill & Richardson Archts

First Presbyterian Church Perrysburgh Ohio Lawrence B. Valk. Arc't N.Y.
Plan of Church at Bennington Vt.
Baptist Church - Bennington Vermont - L.B. Valk. Arc't. N.Y.

EXPLORATIONS IN SAMOTHRACE.[1]

LYING outside the usual course of travel, the island of Samothrace has been until very recently virgin soil for the explorer; and this in spite of its importance in the ancient world as the seat of a mystical worship only less in importance than the rites at Eleusis.

Among the Vatican MSS. is one still unpublished, detailing a visit paid by a celebrated traveller — Cyriacus Pizzicolli, of Ancona — to the island in 1444, when both the buildings described in the book we are about to examine were already ruinous. Since that time they have further suffered from Turkish occupation and from earthquake shocks, and their materials have been stolen, not only for building purposes, but to feed the local lime-kilns. One or two superficial examinations of the ruins were made by various travellers between the years 1822, and 1875, notably by some subsidized French explorers, the details of whose work have never been published. The book we note is the record of explorations made in the island at the expense of the Austrian government, by Herr Conze, an Austrian antiquary, assisted by Herr Hauser and Herr Niemann, both of them architects and professors in the imperial schools at Vienna. Their stay on the island was limited to six weeks, during part of which time as many as sixty diggers were employed. The result was the careful exploration and measurement of the remains of two small temples, and the discovery of many fragments of sculpture, which were conveyed to Vienna. Herr Conze furnishes an account of the progress of the work, and an inquiry into the age and original purpose of the buildings. Herr Hauser superintended the excavation of one temple, and Herr Niemann that of the other, — both works being simultaneously in progress, — and each reports in his own field fully and carefully.

Both buildings, together with a Cyclopean wall and other ruins as yet undisturbed, lie close together on the north shore of the island, not far from the modern village. No pottery was found except in one large mound of sherds, evidently a rubbish heap.

The Doric temple excavated by Herr Hauser faced a little east of north, and was partially encircled by a brook, which was restrained by a great wall from overflowing the level ground on which the buildings stood. In later times the stream burst its barriers, and toward the south, where the water first broke in, *debris* had accumulated to the depth of two to three metres. Only the north end of the substructure of the temple was visible, and no part of the superstructure was in place. The scattered remains found in digging prove that, after having been otherwise damaged, the temple was finally destroyed by an earthquake. The lower members of the structure, the drums of the columns, lay uppermost, and beneath them capitals, architrave, triglyphs, and — deepest of all — the cyma. All exposed parts of the building were of white marble, which was merely a facing for a structure of porous limestone. This latter has been so weather-beaten that it is almost impossible to measure the stones, or to trace their joints. This limestone is native to the island; the marble, of a bluish tinge, is not. It is coarse-grained and not compact, so that the precision of workmanship possible with Pentelic stone cannot here be looked for. As always, the material essentially influences both dimensions and construction.

The proportionate length of the temple is unusual. Measured on the stereobate its length over all is 33.61 metres (130′); the width at the north end 14.50 (47′ 6″), at the south end 13.12 (43′ ½″). The temple was prostyle; the pronaos unusually deep, with two rows of six columns each. In the axis of the building a door led to the cella. This last was divided lengthwise by two walls into three aisles. These inner walls were connected with the outer walls of the cella by transverse walls running across the side aisles, ten on either side. It seems to have been impossible to determine the former height of any of these interior divisions. The cella at its south end was closed on the exterior by a straight wall, but the interior finish was a curved wall of segmental form. This "apse," as Herr Hauser calls it, included the whole width of the cella. The two interior longitudinal walls, stopping abruptly at some distance from the apse, left an open space in front of it. It could not be ascertained how the ends of these were finished, nor in what manner the segmental end wall met the straight exterior walls of the cella. The corners formed between the straight exterior and the curved interior line of this south end were too small to be utilized, and were simply built up solid.

The difference noted in the width of the building at the north and south ends is caused by the steps which, rising from a limestone platform, give access to the pronaos, being continued around for a certain distance on either side. At 8.4 metres (27′ 7″) from the front they form a reëntering angle, and cause the upper course of the foundation stones then becoming higher and running around the base of the cella without any steps. The steps were not found in place, but in good preservation amid the other ruins. In the pronaos the marble stylobate for the four centre columns of the inner row was found in place, so that their position could be accurately measured, the intercolumniations being 2.39 metres (7′ 10⅜″). The elevation of the stylobates made a raised field between the two rows of columns, equal in width to two intercolumniations. The slabs that floored this are of unequal size and thickness. No remains of stereobate are to be traced under the space that intervenes between the columns and the cella. Thus it will be seen that the stereobate was not, as in Attic examples, a substructure for the whole building, but merely for the columns and the external walls. The marble floor reposed, not as in the Parthenon, on a foundation, but merely on a layer of limestone slabs, which rested on the ground or were filled under with rubbish.

The temple is so far ruined that Herr Hauser found it difficult to restore in imagination the space between the inner columns and the cella, which space was deeper than the pronaos proper. No points of support occupied it, for the long marble beams that ran from the cella to these inner columns, and many of their complementary panel pieces, have been found. The sill of the cella door was found in place. It is to be noted that between it and the beginning of the two inner longitudinal walls of the cella is an open space floored with marble and surrounded by a slightly raised band. This space was probably to allow the two leaves of the door to open inward and swing back against the inside of the front cella wall. There are indications that some mode existed of closing the centre aisle from view even when the door was opened, — probably by curtains. No remains of the door were to be found; nor is it possible to tell whether its jambs were perpendicular or slanting. The clear width of the door was about 2.6 metres (8′ 2½″). It may have been of wood overlaid with bronze, as pieces of a narrow bronze cyma came to light. The pronaos certainly was not closed in any way with iron gratings or gates. No marks, such as are visible, for example, in the Parthenon and Theseium and at Sunium, are here to be found on column or stylobate indicating the presence of such iron-work.

The cella is longer than is usual in Greek or Roman buildings, — over all from outside the door-sill 28.80 metres (93′) in length, and 13.12 (43′) in width, the inner measures being respectively 25.91 metres (85′) and 10.6 (34′ 9¼″). The longitudinal dividing walls, as has been said, do not run the full length of the apartment at either end. The foundations of these walls remain to a height of .37 metre (1′ 2½″) above the flooring. There were ten of the strange cross-walls in either aisle, two of them being beyond the termination of the interior walls, between them and the apse.

When such a segmental or apse-like interior termination comes to light as we here find, it is usually ascribed without much discussion to Christian alterations. Here, according to the testimony of the explorers, this is not a possible explanation. No traces of Christian art are to be found, and the whole of the ruins are indisputably of one epoch. The radius of the curve, which, be it noted, *is made with voussoirs*, is 5.75 metres (18′ 10⅝″), and its flooring is two steps higher than that of the cella. In the middle of the first step is a slab 1.165 metres (4.9½⅛″) wide, 1.205 (3′ 11½″) long, and .36 (1′ 2⅛″) thick. Penetrating it is a semi-circular hole, prepared on the edge to receive a cover. This slab is supported by blocks under either end, but beneath the hole is undisturbed soil. Between this stone and the wall is another opening in the floor, showing also the earth beneath, uncontaminated by rubbish. It is irregular in shape, the sides being formed by curved stones. It is as impossible to reconstruct, with any degree of plausibility, the rest of the sanctuary as to decide how the various walls were finished and joined, but no voussoirs were found to indicate an arched form.

Returning to the pronaos we find the columns were without bases, the shafts with twenty channels of elliptical profile, not very sharply or characteristically cut, owing to the coarseness of the marble. The channels of the different drums are not quite alike, showing the touch of various and sometimes of careless hands. Neither dimensions nor entasis (if it existed) can be exactly measured. It is probable the columns were five drums in height. The drums only touch at the outer edge, the centre being rough and a little sunken. The holes for the dowels are seen, and the incisions for lifting the blocks into place. The abacus is unusually deep and heavy. There is no decorative cutting beyond the strictly necessary. The outer columns seem to have been heavier than the inner ones. The architrave shows a pure Greek section, but is badly worked in parts. The triglyphs and metopes show only the thickness of facing stones, and one slab of marble formed one triglyph and one metope. The mutules are very short, only .01 cent. (⅜″). The cyma is rich in comparison with the rest of the structure, a honeysuckle over each metope alternating with a lion's head as water-spout over each triglyph. The tendril-like ornament between is sketchily worked and somewhat thin, and the honeysuckles are unusually stiff.

As has been said, stone beams belonging to the ceiling were found nearly entire. They stretched from the inner row of columns to the cella wall, a distance, including the points of support, of nearly 6 metres (19′ 8½″). To strengthen these stones they were made thicker than appeared to the eye. The visible part, in itself unusually deep, was .91 metre (3′) deep, and concealed above by the ceiling was a further depth in the centre of the stone of .59 metre (1′ 8″), tapering down toward either end. The under side of the beams shows a narrow, incised panelling. They rested, as in Attic *Ionic* buildings, directly on the architrave. Fragments of the coffers, too small for any restoration of their design, were alone discovered.

Nothing was to be traced of the internal arrangement of the cella or of its roof. Its walls were marble-faced outside; inside the soft stone was plastered to a fine surface and painted red. This paint was put on *al fresco*, for in places where it had been renewed one or more times the fresh overlay of plaster was to be traced, unnecessary in any other method. In the apse was found paint of a black-

[1] Archæologische Untersuchungen auf Samothrake. Ausgeführt im Auftrage des K. K. Ministeriums für Cultus und Unterricht, mit Unterstützung Seiner Majestät Corvette "Zrinyi" Commandant Lang, von Alexander Conze, Alois Hauser, Georg Niemann. Mit 72 Tafeln und Holzschnitten. Wien, Druck und Verlag von Carl Gerold's Sohn. 1875.

ish-green color, which, on exposure to the air, turned to a greenish-gray. The red color, on analysis, proved to be from oxide of iron, the gray from powdered carbon. A most noteworthy fact is that, notwithstanding these well-preserved polychromatic decorations on the plaster, no sure traces of color were found on the marble in any part of the building. The whole structure was carefully, even anxiously, secured throughout by a profusion of dowels and clamps. Some of bronze were discovered, the bronze being of a fine quality.

The acroterium on the south gable was very elaborate and unusually large. Freely and cleverly modelled, its fragments help much to decide the probable date of the temple. In comparison with the Parthenon the entablature was low and the gable high, and the diminution of the columns insufficient. Judging by these and other details by the workmanship, and by the sculptures of the north pediment, the explorers pronounce the building to be late Greek, but ante-Roman, presumably dating from the time of the Diadochi. The sculptures are too free and clever for Roman work, too studied and elaborate to have belonged to the fifth century. The fact that they are not finished in the round, but merely blocked out at the back, proves them post-classical without a doubt. If the date of the temple is after all somewhat indeterminate, its purpose can be more easily discovered. It was undoubtedly connected with the mystical worship of the Cabiri and Cthonian rites. The unusually large pronaos would by itself go far to prove mysterious rites, and the opening in the apse floor, like others in various temples, was, to put it curtly, the opening into the under world. Rites of purification are known to have borne a principal part in the *cultus* of Samothrace. The opening being in such a prominent place denotes its connection with the main purpose of the building. The sculptures, furthermore, show bacchanalian elements.

Passing to the second building, the one excavated by Herr Niemann, we find it to be an addition to the short list of ancient circular buildings we are able to cite. No stone of the superstructure was found in place, but about one tenth of its constituent blocks were discovered in the neighborhood. It was also Doric and of marble, and, according to the very confident restoration of Herr Niemann, consisted of a base surmounted by pilasters bearing an entablature and a conical roof. The interstices between the pilasters were filled with marble slabs, carefully wrought into the curved shape necessary. Half columns replaced in the interior the pilasters of the exterior, forty-four in number. The outer radius of the foundation wall was 10.15 metres (33′ 3⅝″), the inner, 7.6 metres (23′ 5⅞″), and the exterior circumference of the architrave 59.66 metres (194′ 1⅛″). The height of the base remains uncertain, but it seems to have had two steps. The building was probably hypæthral. Unlike the other, its age is certain, its purpose problematic. An inscription on the architrave gives the third century B. C., and the workmanship bears out the date. Dedicated to the great gods, it may yet have been not a temple, but rather a memorial receptacle for a statue.

Other antiquities still remaining in the neighborhood of these two buildings are the great Cyclopean wall around the temple, the base of a building with an arched passage beneath it, and close to the Doric temple another in the Doric style, which is perhaps older, as it appears to be entirely of native stone. One large block of Egyptian granite was found in the temple, which, with the apse-like end, affords some indication of Egyptian influence; and the restorers point, by the way, to Arsinoë, whose death occurred in 247 B. C., as likely to have been the one commemorated by the circular building. Furthermore, there are both late Roman and mediæval buildings to be seen in various parts of the island.

In conclusion we may mark as most worthy of notice the facts that in this building, of indisputably Greek origin, voussoirs were used, at least in a horizontal arch, and that polychromatic decoration appears not to have been applied to the marble, though present on the plaster. A more important service, however, than the establishing of any such isolated facts is rendered by explorations of this kind, for they serve to demonstrate that classic architecture was not, any more than mediæval methods, a rigid following of absolute rules. Every such exploration renders more difficult the attempt mathematically to calculate the intentions of ancient builders. Furthermore, we see that the conscientious and perfect workmanship and the sure eye for beauty of proportion and form which we call "Greek" should more properly be held as classic Athenian. The further we stray, either in time or space, from the Attica of Pericles, the less we find of its absolute perfection.

M. G. van Rensselaer.

AMERICAN VERNACULAR ARCHITECTURE.[1]

II.

In Vol. II., page 280, of this journal, we noticed under the above heading the first five parts of Mr. Woodward's "National Architect," Vol. II. We have now received this volume complete with one hundred well executed plates.

The completion of this volume does not do more than fairly fulfil the promise of its earlier pages. It presents an accurate picture of the commonplace forms in American buildings,—forms such as give to American towns their characteristic expression, and which have been in great part legitimately developed out of our conditions of living. As this book gives a deliberate record of these forms, as it

> "nothing extenuates,
> Nor sets down aught in malice,"

but ordains and gives a certain grammatical coherency to a style of building which every intelligent carpenter or builder has fairly in hand, and can set forth for you with a facility which, if fatal in respect to art, is at least significant of an established vocabulary of building-forms,—as this book doubtless performs this service for the public and for history better than any which has preceded it, and perhaps may be accepted as the American parallel of M. Daly's admirable "Architecture Privée" of the time of Napoleon III. in France, it should possess an especial attraction for all who are interested in the progress of art. Certainly to the foreigner, as the expression of a vernacular architecture, it will present elements of greater interest than would the published works of any accomplished American architect, which have derived their inspiration more directly from the study and adaptation of familiar and fashionable European forms, and which, although intrinsically of far greater value, are indicative rather of individual achievement, of personal culture, than of a national architecture.

Mr. Woodward has been prolific in his architectural publications: he has given us "Woodward's Country Homes," "Woodward's Cottages and Farm Houses," "Woodward's Suburban and Country Houses," and there is an ominous "etc." added to the list. We now have the second volume of Woodward's "National Architect," and so long as he remains truly national, so long as he continues to keep a vigorous curb upon his resources of imagination, there is no reason, from a mercantile and business point of view, why he should not go on indefinitely multiplying his designs for villas and town houses. But he must beware of inspiration or invention, of poetic sentiment or original thought; the moment he suffers these elements to enter into his compositions he will get beyond his public and they will have no more of Woodward. As it is, he has discovered a profitable field of enterprise in flattering and gently leading the tastes of the people. The solitude which genius makes for itself is imposing, but rarely remunerative.

This book contains eleven designs for city and country houses, types which have their principal seat in and about the city of New York, but which obtain more or less acceptance throughout the North and West. They are thoroughly illustrated by plans, elevations, and sections, and, in many cases, by details drawn to a larger scale and very accurately delineated. There are also designs for summer-houses, carriage gates, tool-houses, arbors, verandas, oriels, balustrades, finials, crestings, dormers, gabbets, and porches, a revelry of jig-sawing, and a mine of wealth to the "practical architects" of our country towns. Architecture in boards has never received a more complete illustration. Not unfrequently, the drawings recall to mind the pages of Degen and the German "Skizzen Buch," which some fifteen or twenty years ago so pleasantly assisted the callow imaginations of young American designers; but most of these drawings are made indisputably our own by a certain infusion of what we are constrained to call vulgarity. The reserve and elegance of form which are the result of high training, the chastisement and self-denial which come from knowledge and discipline, the imagination which dares to venture upon new flights, the education which prevents these flights from repeating the disaster of Phaeton,—these qualities are not at present to be found in Woodward, nor in the national architecture. When, by secular processes of development they shall be found in the Woodward of the future, we shall have become an artistic people, and architecture proper will at last have a home and a recognition in the land. Until then the profession must needs go forth like missionaries among the heathen, starting with earnest convictions, and then learning the language; becoming familiar with the new conditions of life; encouraging each other; fighting against the Philistines; overcoming innumerable obstacles of ignorance and prejudice, not only among the unconverted, but within their own breasts; gradually winning their way to understand and to be understood. As a record of the condition of the heathen at the present stage of progress, Mr. Woodward's "National Architect" will be invaluable at all times.

Take, for example, plates 57 to 64 inclusive, representing a "design for a city house with a rear extension, to be erected on a lot twenty-five feet wide." Here we have the veritable "brown-stone front" of our literature, four stories of windows absolutely similar in architectural composition, a bracketed cornice returning upon itself, a high stoop with Doric columns and a composite entablature, round-headed windows in a rusticated basement; here are the familiar plans very correctly and carefully drawn, with no essential detail of information omitted. As a type, this design is in every way admirable; it is the exact expression of the manners and customs of domestic life in a great American city of the year 1878, for it contains no point of originality, no suspicion of exceptional treatment in any particular. It belongs to a class, and marks a point of progress far better than would any work of genius.

In like manner all the country houses in this book are planned remarkably well, but, in this respect and in respect to their elevations, they seem to be, so far as possible, within their sphere, the very symbol of the times. They represent safe points of departure

[1] Woodward's National Architect, Vol. II., containing original designs, plans, and details, in working scale, for city and country houses. By Geo E. Woodward, Architect, Geo. E. Woodward, Publisher and Importer. Copyright, 1877. 128 Chambers St., New York.

for the architect. They are formulas of design for popular use, based upon experience, developed by necessity, and shaped by tradition. As such they have all the crudeness and vulgarity that belong to all popular manifestations of art in these days. Between this state of society and that of the Greeks of the time of Pericles, for instance, or that of the Royal Domain in the time of St. Louis, there is, in respect to art, a difference significant of the especial function of the profession of architecture in these days; for it has a function, notwithstanding that Woodward meets with a large sale, and that the commonplace is common.

WOODWARD'S ARTISTIC DRAWING STUDIES.[1]

THIS is a book of a kind that has been very common, and from its imprint being without a date, we presume it is expected to be perennial. It consists of seventy or eighty plates, containing a variety of subjects — heads, figures, animals, foliage, and landscape — copied in lithograph from various originals. The lithographing is the usual conventional thing, apparently done by several different hands, at least in several different manners, and with fair mechanical skill, but without showing any special knowledge or intelligence. We cannot admire the selection of subjects. The heads and limbs are mostly like ordinary life-class drawing, from commonplace models; the animals, figure-sketches, and foliage are the conventional drawing-master's copies. One or two of the heads are from originals of greater pretension than the rest, and certain outlines of animals, purporting to be from sketches by Barye, are rendered with peculiar insipidity. Some of the heads and foliage drawings, we must confess, are atrocious. The drawing-master who uses these copies may find them convenient to save his labor or cover his ignorance. The pupil may learn mechanical neatness, as from a hundred other books that he can find, some better, some worse; but he will not be likely to advance either his taste or his knowledge.

THE ILLUSTRATIONS.

HOUSE FOR JAMES CHENEY, ESQ., SOUTH MANCHESTER, CONN. MESSRS. CARRÈRE AND RICHARDSON, ARCHITECTS, NEW YORK.

DESIGNS FOR THE DECORATION OF A WALL, COMPETITION NO. III.

IN this competition only fifteen designs were submitted. The jury has awarded the first prize to the design by "X. Y. Z.," and the second prize to the one by "Bay State," both of which we publish with this number. Honorable mentions have been awarded to the designs by "Incognito" and the author of the token a palm branch crossed by an arrow, which, with one other design, will be published next week. As it is somewhat difficult to describe in words the graphic symbols which some competitors use as signatures to their work, we will ask them in future to bear this in mind.

FIRST PRESBYTERIAN CHURCH, PERRYSBURGH, O. — BAPTIST CHURCH, BENNINGTON, VT. MR. L. B. VALK, ARCHITECT, NEW YORK.

CORRESPONDENCE.

THE LATE SIR G. G. SCOTT. — THE WELLINGTON MONUMENT. — THE ROYAL ACADEMY.

LONDON, *30th April*, 1878.

THE death of Sir G. G. Scott has been the greatest loss the profession has sustained in modern times. In the midst of his career, at the height of his fame, he has been suddenly called away from his work. It is not too much to say that the blank thus unexpectedly made in our ranks will be very difficult to fill up. A man of great experience and high culture, he took a deep interest in everything connected with architecture; he might be almost called the apostle of the Gothic Revival, so much was he identified with its rise and progress. Probably no one has had anything like the variety and quantity of church work pass through his hands that he had, — from the humble village church to the stately cathedral, — and whatever opinions there may be as to the quality of his work from a purely artistic point of view, there can be none as to the honesty of purpose, untiring energy, and burning zeal he at all times brought to bear on it. The architectural societies owe him a mighty debt of gratitude for the cordial and weighty support he was ever ready to give them; indeed, but for him the Architectural Museum would probably have ceased to exist. Many of the kindred arts connected with architecture were called into being and kept alive by the requirements of his practice, or through his influence; many of the workers in them owe their name and position to the like cause, as many a building scheme does its success to his name as its architect. Throughout the length and breadth of Great Britain and its dependencies, as well as on the continent of Europe, the impress of his genius has been left. No name has attained a more world-wide reputation than his, and no one in the world of art will be more universally regretted than he who now sleeps under the nave of Westminster, surrounded by the art he loved so well.

Already there are several proposals for a memorial to his genius, though standing almost anywhere in England one might be inclined to quote what was said of another great church architect: "and for his monument look around you."

Strangely enough one of these proposals is a restoration scheme for the west front of St. Alban's Abbey. Now it is no secret this same subject of restoration caused Sir G. G. Scott no little trouble and personal annoyance in his later years, — or rather the Anti-restoration Society through some of its most prominent members did, — and notably during the recent discussions of the subject in the Institute, when several bitter attacks were made on his works in that department of his practice. It is not to be supposed that in his long career Sir G. G. Scott never erred; that he always did just what was right and no more, either in new buildings or old. As we have said, there are probably plenty of opinions about this, — it would be strange indeed if there were not. — but the wisdom and good taste of the attacks recently made on him are more than questionable, and knowing how keenly he felt on the matter, it was worse still when, after his death, one of the principal actors of the opposition, on being called on by the president at a meeting of the Institute, failed to do him the tardy justice of even disavowing all personalities on the vexed question. So the proposal to restore the west front of St. Alban's has been received with another howl from the now notorious society, who pursue the argument even over his grave. St. Alban's Abbey was under his care; in all probability the west front would have been restored by him; so if it is to be done at all — as done it will be — there is something as graceful as it is appropriate in dedicating it to his memory. It seems to us the anti-restorationists would best consult their own dignity, and the cause they profess to serve, if they used a little more discrimination and judgment in their dealings with those who may differ from them, and did not run their heads against everything and everybody as they do at present, often too on the most meagre information and faulty premises.

On Easter Monday the long waited for Wellington Monument was thrown open to public inspection in its place in St. Paul's Cathedral. It is much to be regretted that its gifted sculptor has not lived to see it finished; more so still that its crowning feature — the equestrian figure of the duke — is still wanting. The design is incomplete and ever will be, till the horse and his rider are in their place. The model for the group was partly finished by Mr. Stevens before his last illness, quite sufficiently so to know what his intentions were and to have them faithfully carried out; we trust therefore the day is not far distant when this noble work will be completed as its author intended. It is placed in a somewhat bad light in the chapel in which it stands, — against a large window looking south, through which the strong sunlight streams and throws the whole of one side into shadow. It is to be hoped this may be remedied to some extent by toning down the glaring light from the window, by stained glass or otherwise; at all events it is much needed.

As it stands the monument is the finest modern work of the kind we possess, with the genius of a true artist stamped on its every line. The recumbent figure of the duke, the groups of "Valor and Cowardice," and "Truth and Falsehood," might be from the studio of Michael Angelo himself, so vigorous are they in design and powerful in execution, while all the architectural work is carried out with a spirit worthy of the best days of the Renaissance, showing what an exceptional man its sculptor must have been to understand architecture so thoroughly. In his life he declared he knew of but "one art," and certainly painting, sculpture, or architecture, all seem to have come alike to him; he knew and did all well. His scheme for the decoration of St. Paul's, of which he left a model of the dome, is the finest that has yet been brought forward; and had he lived and been entrusted with the work, we doubt not we should have had as good reason to be proud of it as we have of his monument to Wellington. The great mosaic figures in the spandrels of the dome are all of his scheme which ever saw completion, but are enough with the rest of his works to tell us what a genius was lost in Alfred Stevens.

Next Monday — the 6th of May — the Royal Academy opens its doors again; this week a series of private views has been given, to the artists, the press, and the favored friends of the Academy. The architectural collection is not above the average, and is stronger in civil than in ecclesiastical work. The place of honor is given to the late Sir G. G. Scott's designs for the Hamburg Exchange. In two magnificent pen-and-ink perspective drawings, his Gothic and classic design for the same building hang side by side, — the former in that phase of secular Gothic long afterwards identified with his name, and the latter founded on the type of the work at Heidelberg; and though neither of them was ever carried out, they still remain amongst the most successful of his efforts, better in many respects than either his subsequent designs for the Foreign Office, or the Berlin Houses of Parliament. Of the members of the Academy Mr. Norman Shaw has sent a couple of designs of houses, — one a very beautiful drawing, — which we shall notice again; Mr. Street, some school or college building; Mr. Pearson (who is mentioned as likely to be the new R. A. in Sir G. G. Scott's place), a fine drawing of his noble church in Red Lion Square, and a somewhat unsatisfactory Elizabethan country house; Mr. Waterhouse, the new A. R. A., a country house in his peculiar phase of Gothic, and an interior of the hall of the Natural History Museum, for which artistically, perhaps, one cannot say very very much.

[1] Woodward's Artistic Drawing Studies, for Artists, Art Students, and Schools. New York: Geo. E. Woodward, 130 Chambers St.

The principal competitions of the year are represented by the successful and some of the unsuccessful designs, such as the Wakefield Town Hall, the Barrow-in-Furness Municipal Buildings, the Leeds and Nottingham Public Buildings, and the Kensington Vestry Hall. Several churches of the recognized Gothic type and several interiors in the present fashionable mode are also there, all of which we hope to notice more in detail; but we cannot pass over a design for a college tower by Mr. Bodley, a noble piece of work in late Gothic and of striking character, a great square stone tower, crowned by a wooden lantern, thoroughly English in design and splendidly detailed, at once original and artistic throughout.

A quaint design for Tipperary Town Hall, by Mr. Jackson, also claims notice; it is in that peculiar phase of late domestic work which he has employed in his Military College at Oxford, in which plaster walls and red brick finish play a prominent part. How it will all look in execution remains to be seen. Two richly colored drawings show Mr. J. P. Seddons's design for the decoration and furnishing of Queen's College, Oxford, almost too highly colored to give a good idea thereof; it is so gorgeous one loses the detail of the design.

ST. LOUIS.—ITS GROWTH AND ADVANTAGES.—ITS BUILDING MATERIALS.—THE COST OF LABOR.—REAL ESTATE.

St. Louis.

The census of 1870 surprised and gratified the people of St. Louis, by showing that their city, with 310,869 inhabitants, was the fourth in size in the United States, following in order New York, Philadelphia, and Brooklyn. The city directory recently issued estimates the population of St. Louis, at the close of 1877, at 502,687. Another decade of growth in the same ratio would make St. Louis about as large as New York is to-day.

St. Louis is believed to be the healthiest city on the globe. The registration of deaths is careful and systematic, yet in 1877 the total mortality was but 5,669, or at the rate of 11.1 in 1,000. The mortality of London and Paris, two of the healthiest cities in the world, is about 20 in 1,000; that of Washington and Philadelphia is about the same; while in Baltimore the rate is about 25 in 1,000, in Boston 26 in 1,000, in Chicago and New York each 27 in 1,000, and in New Orleans 33 in 1,000, according to the latest information at hand.[1] This remarkable salubrity may be ascribed chiefly to the excellence and abundance of the water supply, to the extensive and well-arranged system of sewerage, to the almost entire absence of overcrowding in tenement houses or otherwise (there are but two known tenements in St. Louis, holding together not much more than one hundred families), to the ample width of the streets and alleys in every part of the city, to the vigilance of an efficient board of health and police department, and largely also to the healthy site of the city, which is a broad plateau rising rapidly from the bank of the Mississippi to a level far above high-water mark, thence extending westward in a series of gentle undulations whose ridges are more than a hundred feet above the highest stage of the river floods.

The city is somewhat lozenge-shaped in plan, with a convex river front of about sixteen miles, and a maximum width of seven miles. In the older parts the Philadelphia system of numbering the streets parallel to the river has been followed, but in the newer portions this plan has unfortunately been abandoned.

The amount of building during last year was moderate. The number of permits issued was 2,115; the valuation[2] of the buildings was $3,229,720. These buildings are almost exclusively of brick, though sometimes with fronts of sandstone ashlar on the more expensive houses. The frame buildings are rarely of any consequence, being chiefly sheds, stables, and small additions to brick houses.

St. Louis dwellings are almost invariably arranged on the L plan, the dining-room and kitchen being in a rear building on the same level with the parlors. Basement houses are not popular, and are rarely seen. Wide alleys bisect every block and give convenient access to each house at the rear.

Building materials of all kinds are abundant, cheap, and of good quality. The city rests upon a stratum of excellent brick-clay, often many feet in depth, from which are made the best of ordinary and face brick, perfect in color, shape, and surface. A favorite method of grading down a lot that is too high is to establish a brick-yard on it and convert the surplus material into a marketable commodity before removal. Beneath the clay are inexhaustible beds of white limestone, hard and strong, yet easily worked, and furnishing the best of material for rubble walls and for cut-stone steps, sills, and other details. This stone crops out along the river front and in numerous "sink holes" and other depressions within the city limits. Thus quarries as well as brick-yards are everywhere to be found within convenient reach. The limestone also furnishes the best of lime for mortar, while the Mississippi River benevolently deposits an excellent supply of clean building sand on the bars above and below the city and on the opposite shore. Fire-clay and coal are found beneath the limestone, and both deposits are largely worked. Cement is obtainable from Alton, twenty miles up the river. The Iron Mountain, eighty miles south by rail, supplies iron in quality and quantity to suit any demand; also an excellent red granite closely resembling the well-known Scotch granite, and used in the same way for polished shafts on the exterior of buildings. From the same place come considerable quantities of yellow pine lumber, while white pine is brought down the river on rafts. It has thus the benefit of a thorough water-soaking in transit as an aid to seasoning, with, however, the disadvantage of a consequent loss of brightness and uniformity of color, and a more or less serious discoloration. For this, among other reasons, it has been found difficult to introduce here the custom of finishing interior wood-work in shellac, as is so often done in Eastern cities. Painting and graining are still the universal fashion in St. Louis interiors.

During the past winter rubble masonry foundations have been laid for the extremely low price of $1.75 per perch of twenty-two cubic feet, mortar, labor, and everything else included. Some weeks ago, however, the quarrymen and the leading stone masons formed a combination and advanced the price to $2.50 per perch, which is the nominal rate at present. Bricks are furnished and laid in the wall for $8 per thousand. Plastering is done for about eighteen cents a yard. Floor joists of ordinary sizes are held at $14 per thousand feet; "Star" lumber at about $35 per thousand.

The real estate market is dull, and has been so for the past ten years or more. Good lots within half an hour's ride of the centre of business, in an unexceptionable neighborhood, fronting on good streets well paved and sewered, with water and gas, and paved alleys, may be purchased at $25 and upward per front foot. These lots have a depth of 100 to 150 feet or more. A fair six-room brick house can be built for $2,000, and $500 more will suffice to add almost every desirable convenience. Such a house, if well planned and in a good neighborhood, will rent, when new, for $25 to $35 a month, according to locality. Older buildings of the same size can be rented as low as $20 a month in some parts of the city.

In St. Louis, as in nearly all the other cities of this country, except New York and Boston, there is an almost entire absence of houses planned for occupancy by two or more families. The German population have, indeed, for years been in the habit of building what are popularly known as "Dutch houses," two stories high, intended for one family to a floor, the upper floor being reached by outside stairs at the rear; but these houses are quite destitute of the conveniences demanded by American tenants, and are occupied almost exclusively by foreigners. Within a little more than a year, two small but genuine apartment houses have been built. One of them was eagerly taken at remunerative figures as soon as it was done, and the owner of the other is understood to be about to build again, on a much larger scale. It may therefore be assumed that the era of flats has begun in this city, greatly, no doubt, to the increase of the comfort of its citizens. Whether or not it will equally promote the healthfulness of the city will remain to be seen.

C. E. Illsley.

TRINITY CHURCH, ROCKAWAY, L. I.

New York.

Mr. J. Cleveland Cady has been doing a piece of clever work in the new Trinity Church at Rockaway, L. I., in the village of Woodsburgh, which was dedicated a short time ago. The church has a beautiful site, with a large churchyard, rectory grounds, trees, shrubs, vines, and flowers around it, and a view of the ocean in the distance. The ideal building in the minds of a considerable portion of the farmers around there was an imitation of a city church, even though it should be a very poor imitation, and of course had nothing in harmony with its surroundings. There were, however, a sufficient number to sustain the architect in carrying out a thoroughly rural building, which combines with the landscape and seems almost a natural feature of it. It is a rambling building, whose low walls and porches group with the beautiful flowering shrubs, whose loftier gables peer through the openings in the trees, and whose spire and belfry rise quite above them. The interior shows the construction, which is simple, very fully; the colors are rich but quiet. The body of the glass is of a silvery tone, with a border of soft green. The apsidal chancel, however, has been made the focal point of the building, and its nine memorial windows are a mosaic of the choicest antique glass, in the richest colors, the whole glowing like a mass of jewels. While the windows in the church seem to reflect the sentiment of nature, the trees and the sky, those of the chancel suggest a glory beyond that of nature.

The church is fitted in butternut, has a fine organ, and the seating capacity is for about four hundred persons. As was well said of it by a competent critic, "the building has been designed to harmonize with its surroundings, and in the interior to reflect something of the freshness and sweetness of nature combined with a dignity suitable to the temple of the Most High." In cost, too, it is remarkable, the entire expenditure falling short of $12,000; and yet in an artistic sense the congregation possess a treasure which many a purse-proud body, spending thrice the sum, has failed to secure. W.

The Tower of Aspermont.—The ancient tower of Asperment in Switzerland, which crowned a mass of high rocks, and which had withstood the tempests of ages, fell lately with a tremendous crash, and crushed a number of goats which were browsing in its shadow. The castle, with which it was connected, was built by the Roman Emperor Valentinian in the year 368. It had long since crumbled away.

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[1] Report of Elisha Harris, M. D., of New York city, to the National Health Association in 1874.

[2] The expenditures by the government on the new custom-house and post-office are, of course, not included in the valuation above given.

THE QUALIFYING OF ARCHITECTS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — I have read with interest your papers on "The Qualifying of Architects," and I now hasten to respond briefly to your kind invitation to "any one" who will offer his suggestions on the subject.

That an architect should know something, that he should have an education which will enable him to *do* his work well, is admitted by all. As you say, the President of the American Institute of Architects has made that education the subject of an address at the last convention, the chapters (especially the Boston Chapter) have taken it up in good earnest, committees have been appointed, the public press is interested in it, all the world, excepting ourselves, has long ago made provisions for it, but we are still in doubt as to *what* an architect should really know? how he is to acquire knowledge? what is to induce him to acquire it and what is to become of those who either will not or cannot acquire it and who insist upon being architects without it?

It is seriously questioned whether the public will look with favor upon the educated architect, or reject him as a member of a privileged class. There is but one thing not subject to doubt, namely, that a number of architects will give the cold shoulder to any scheme of superior education, and that the general cooperation of the profession is not to be relied upon, even though the public and the law should unite in its favor, unless the *de facto* architect of the day is permitted the undisturbed pursuit of his work whether he knows it or not.

That great ignorance on the part of the public and (to be candid) also on the part of many architects, gives rise to endless errors and prejudices, which must more or less embarrass this subject, cannot be denied. The question in my mind is, whether it is better to submit to these errors and adapt ourselves to these prejudices, or to remove ignorance by a clear statement of the case and overcome prejudice by prompt explanation. Is it not wiser to trust to the good sense of the public (which includes the profession), and remove an existing evil, as it were, by common consent rather than endeavor to mitigate it by half measures?

To this end let us proceed to determine what an architect should know and why he should know it.

It is the function of the architect to construct buildings and give to them an artistic expression of the ideas and purposes for which they are erected. Artistic expression in architecture is to be attained only by the modelling of inert matter in its relation to other matter. This relation is construction, and construction therefore forms the groundwork and keynote of all architectural art effort. It is not possible to arrange, model, decorate, or color masses of matter with a view to express vigor, elegance, strength, repose, or any of the statical attributes of architectural art, without a clear conception of the mechanical conditions of matter under the influence of gravitation.

To avoid all controversy or cavil in this direction I do not mean to say that mouldings or leaf decoration are to be projected by lines, the geometrical result of the relation of forces, but that the knowledge of the laws governing those relations must be ever present in the mind of the architect, to secure rational and expressive forms, which will fairly represent the ideas which are the basis of his building. It is not true, as asserted by Fergusson and others, that the work of construction can or may be separated from that of the art work of the architect and performed by another person. This can be done only in that exceptional condition of architecture (which is not architectural art) where forms are borrowed from the past and externally applied to a building without organic relation to it. This is not living art. It is not the production of original poetry. It is the performance of a funeral dirge of the past at a modern wedding. It is not doubted or disputed by any one that a knowledge of mechanics is necessary to the architect to enable him to build well.

To express tersely what will comprise such a knowledge of mechanical principles as should be possessed by every practising architect, I will state that "Weissbach's Mechanics" is the textbook generally used at the present time in good polytechnic schools and universities both here and abroad. To read Weissbach, the student must be familiar with mathematics (I mean by this the whole of mathematics which begins with algebra and ends with the calculus, comprising geometry, descriptive and analytical geometry, trigonometry, plain and spherical conic-sections, etc.)

Vast sums of money are continually wasted upon spurious scientific improvements in artificial building materials and in the matter of heating, ventilation, acoustics, etc., invented by ignorant persons and adopted by reason of the utter lack of scientific knowledge on the part of the architect. It is not asking too much to require that every practising architect shall be familiar with the progress made in the knowledge of light, heat, electricity, magnetism, and sound, as laid down say, in "Deschanel," another well-known textbook in our own universities and polytechnic schools, or some other equivalent authorities. Architectural monuments mainly relate to ideas connected with religion, society, and the state, which have their foundations in the past. The treatment of these ideas is in all cases a poetical one. This indicates, that to the architect at least a general knowledge of history and a certain acquaintance with literature are indispensable. General æsthetics, architectural æsthetics, history of architecture, and drawing, as branches of education of the student of architecture, are a self-evident necessity and need no further comment.

How is the architect to acquire the knowledge of all this? As it is the special province of polytechnic schools to teach it, and as it is not taught in architects' offices, the many excellent polytechnic schools here and abroad may be safely recommended to the student of architecture as the best place wherein to acquire his education, with the special understanding that he should not enter an architect's office until he has completed his theoretical studies. Then and then only can he derive benefit from the practical work going on in an office which *may* answer the purpose of an academical course with young men of exceptional ability and industry.

But if a man has not the advantages of a polytechnic education, is he to be excluded from the practice of our profession on that account? No! certainly not, if he has acquired the necessary information elsewhere. But this must be made patent to the profession and the community in some way; — and how? Any university or polytechnic school may, upon the request of the profession, be induced to examine candidates at stated times and certify to their proficiency. The *modus operandi* would be this: The faculty through the proper professors would prepare, say 200 questions covering the range of mathematics, 100 questions from Weissbach, 100 from Deschanel, 100 each from some recognized history and æsthetical work on architecture (say Kugler, Lübke, or Sumer).

These questions would be printed upon separate cards and placed in piles upon a table, where the candidate could draw six cards from each pile. If he answers four of every six questions respectively let him pass; he knows enough to be able to learn more. But let there be no architects' commission, it is not needed and may do harm. The faculty of a university is quite sufficient. It is the most competent and the most impartial tribunal to be found for this purpose. The universities and polytechnic schools perform this duty abroad, not only to determine graduates for the various professions, but also for the public service, and their certificates are accepted as final by the various departments of the government.

It is not necessary that the profession should ask the State to prescribe these qualifications of architects by law and enforce such a law by penalties. This may be and probably will be done in the far future without professional interference. All we need to do to answer our present purpose, namely, *to induce architects to acquire a proper education*, is to state to the public our convictions as to what this education should be, how it is to be obtained, and how it is to be made patent that it has been obtained; and then support these our convictions by setting an honorable example by passing such an examination ourselves. Some of us have already done so, and it will not be onerous to do it again for the good of the cause. Others have never had a regular training, but yet are able to join in this enterprise; nor is it necessary that there should be many. If the Atlantic seaport towns will furnish twenty names who will respond to this call, it would be quite satisfactory; if not, ten would answer very well.

You will ask perhaps, "What is to become of the many hundreds of practising architects who are not prepared to pass such an examination?" I have no anxiety on their account. As there is no compulsion in the matter, they can continue to practice without an examination.

Some of the young men, who will realize that to become, and really to be an architect, leads through harder work than they are willing to perform, will at once abandon the profession and become useful members of society in some other walk of life. Others again, earnest, vigorous, and not without education, will set a time for themselves when they will walk up to the rostrum and ask for a regular admission. Two or three years of earnest work will answer this purpose very well. Here it is, where the chapter organizations will serve an excellent purpose; they will be so many classes, able to pay competent tutors to prepare members for an early examination. Some of the older practitioners who feel that they cannot master the subject, nor change their profession at this late hour, will continue to practice architecture as they have done heretofore, by *guess*. Yet if an important work involving serious questions in construction should fall into their hands, to avoid undue responsibility they will request some regular architect to correct their plans, at least as far as said construction is concerned. I am sure, that all of us will be glad to lend them a helping hand.

There will be a few irreconcilables who will talk nonsense about natural abilities and hereditary genius, who will rail against a privileged aristocracy of learning; will pronounce science, mathematics, and æsthetics a humbug, and will prove to their own satisfaction that the man who knows nothing is practically best prepared to do everything.

We can bear this patiently. It will neither convince nor impress any sound mind nor any appreciable number of even the less instructed part of the public.

Perhaps you will explain to them that it is no special privilege to practice what you know, that a profession cannot be considered a privileged class, no matter how well prepared its members may be to perform their work, as long as no one is excluded from it for any other reason than insufficient ability. Perhaps some day you will get out of patience and tell them that it is *they* who form a privileged class, permitted by the leniency of their fellow citizens to practice a profes-

sion which they do not understand, and that their clamor should be stopped by a wholesome legislative enactment against architectural quacks. Most respectfully,

Leopold Eidlitz.

AUTHORITIES ON THE STRENGTH OF MATERIALS.

London, Ontario, May, 1878.

To the Editor of The American Architect:

Dear Sir,—After reading several articles in the *American Architect*, in regard to accidents, and particularly one of May 11th, being an accident at St. Johns, wherein it says the third floor fell, being overloaded by the goods of the tenant, etc., the question occurred to my mind, Whom are we to take as reliable authority as to the weight a given amount of flooring will carry, or roof trusses, iron pillars, wooden pillars, beams, etc., etc.; in fact, for the strength of materials, as we have not the opportunity, in most cases, I presume, of testing these matters for ourselves?

I, the writer of these lines, am using Trautwine's "Engineers' Pocket-Book." I have other works, but I seem to prefer the one mentioned. Your opinion of the same would be gladly accepted by your correspondent.

I have put up some pretty weighty buildings when a builder, but have never had an accident, and generally am told that I build very strong. But I love proved it the safe side. And, having considerations on hand just at present, as to strength of materials, your answer in regard to the best authority would oblige.

Yours truly, W. J.

[Trautwine's book, which our correspondent uses, is a well-tried and trustworthy hand-book, though very condensed and elementary. The authority most commonly consulted, perhaps, is Professor Rankine, who treats the subject at length, and with mathematical analysis, both in his "Applied Mechanics" and in his "Civil Engineering." But decidedly the most helpful book of the kind that we know, from the architect's point of view, is Mr. Hatfield's "Transverse Strains," published last year by John Wiley & Sons, which is worked out with great clearness and completeness, and carefully adapted to the details of construction actually in use among architects and builders. It is confined to cross-strains, as in floors, girders, roofs, trusses, and the like, and does not include the discussion of piers and columns. In the study of framings the methods of graphical statics have been found to be extremely convenient, and are much in use of late, avoiding as they do the troubles of algebraic computation. Treatises on them have been published in the United States by Professor Greene and Professor Dubois. They are also introduced in Mr. Hatfield's work. —Eds. American Architect.]

YELLOW MORTAR.

Boston, May 17, 1878.

To the Editor of The American Architect:

Dear Sir,—About two and one-half years ago I experimented with making yellow mortar, and had some brick laid with it. I used yellow ochre for coloring, but found it took a great quantity in proportion to the mortar. Will you please inform me, or inquire through the columns of your paper, what is generally used for coloring?

O. F. Smith.

WOOD ENGRAVING.

We take from the *Architect* the following extracts, which we find in it. They come from Mr. John Newton's essay, prefixed to the catalogue of a recent exhibition of wood-cuts by the Liverpool Art Union.

Upon the origin of this art a great deal has been written, which may be found in the works of Papillon, Heinecken, Jackson and Chatto, Weigel and Zestermann, and A. F. Didot, but all that is certainly known may be told in very few words. Carving in wood, and, consequently, the use of wooden stamps, must have been practised and used before the dawn of history. We know that the ancient Egyptians and Assyrians employed such stamps to impress their primitive characters upon soft clay, and specimens of them actually exist in our museums. The Romans also used them; though, to brand their slaves, they were obliged to employ brass ones. No further advance was made until the twelfth and thirteenth centuries, when engraved blocks began to be used for giving off impressions in color on to the smooth surfaces of silk and other fabrics. Weigel gives no less than ten illustrations of printing from wooden blocks on coverlets and garment fabrics before and during the fifteenth century. Such imprints increased considerably during the thirteenth and fourteenth centuries, when liturgical vestments and choice draperies were often thus elaborately adorned. Linen, silk, satin, and even leather received such impressions in various colors, sometimes in gold. Here was the germ, certainly, yet it grew not into the art. Down to the end of the fourteenth century, no mention has been found of wood engravings. Boccaccio and Petrarch, and our own Chaucer, are silent about them. Even Richard de Bury, Bishop of Durham, in the reign of Edward III., in his curious "Essay on the Love of Books," says not a syllable about any other illustrations but those painted by hand. There is not a single wood engraving existing which there is any good reason to attribute to an earlier date than the beginning of the fifteenth century.[1]

At length we tread on firm ground. Some eighty years ago Heinecken, a most indefatigable hunter after book rarities, discovered in an ancient convent at Buxheim, near Augsburg, a large colored wood engraving of St. Christopher, with the date, 1423, distinctly cut underneath. It was pasted inside the right-hand cover of a manuscript book finished in 1417. Another large engraving (*The Annunciation*) was pasted inside the left-hand cover, and both were colored by stencilling. This volume is now in the magnificent collection of Earl Spencer. Many other single wood-cuts have been discovered which may be somewhat earlier than these, but the St. Christopher still remains the earliest wood-cut about the date of which there is no dispute.

The next step in the progress of wood engraving was to print a connected series of large wood-cuts, having at the top or bottom of each an explanation of the subject of the picture, and to bind them together as a book. Several of these block books still exist, of which the best known are—1. Apocalypsis; or, Scenes from the Life of St. John and from the Revelations; 2. A History of the Virgin Mary, as it is supposed to be typified in the Song of Solomon; 3. The so-called Biblia Pauperum, which consists of Typical Figures of the Old Testament, followed by their Antitypes in the New; or, The History of Jesus Christ pictorially represented.

The cuts in all these early works are executed in the simplest outline manner; there is not the least attempt at shading, by means of finer lines—cross or parallel—to be perceived in any of them, and the most difficult part of the engraver's task must have been the cutting of the letters. All the earliest wood-cuts, probably until the invention of printing, were taken off by laying the paper on the inked wood block, and rubbing the back of it gently, as wood engravers do to this day in taking off their trial proofs. Each leaf was printed on one side only, and, to make a number of them into a block book, the backs of the leaves were often pasted together.

But all these advances were soon to be cast in the shade by the discovery of the art of printing. The illustrious Gutenberg, one of the greatest benefactors of the human race, was engaged for many years in laboring to perfect the divine art of printing. He commenced by taking a hint from the wood engravings which so suddenly sprung into demand, and had letters cut in wood, with holes through them, by which they could be strung on wires. These were, no doubt, soon thrown aside for types made of some lead alloy, cast in brass matrixes, as appears from the records of a trial he had in 1439, from which we learn that he had invented a press, and that this was one of the secrets of the "wonderful art" to which Gutenberg already laid claim. By the invention of printing a wonderful stimulus was given to wood engraving, and the two inventions progressed, hand in hand together, in a union that bids fair never to be dissolved. Thenceforth the block books were usually multiplied at the printing-press, and, in the last of the series, the "Speculum Humanæ Salvationis," which first appeared about 1460, the wood-cuts are taken off by friction, as before, the back of the leaf being left blank, but there is an accompanying text printed at a press, from movable type. And now, by the rapid diffusion of printing, the two arts spread over Europe. In 1461 appeared the first printed book of fables, illustrated with rude wood-cuts, and within twenty years from that time quite a series of illustrated Bibles had been produced.

In spite of the vast stimulus given to wood engraving by the invention of printing, there was no improvement, to the close of the fifteenth century, in the technic of the art or in the designs engraved, and the best of the cuts during that period are decidedly inferior to the best of those in the early block books, or even the still earlier ones, such as Earl Spencer's. One only exception can be made, viz., the beautiful title-page to the Latin edition of "Breydenbach's Travels," printed at Mentz in 1486, which, both in design and execution, is the finest wood-cut produced to that date.

But now appeared the greatest artist who ever drew on a wood block, the all-accomplished Albert Dürer. He was born in 1471, in the glorious old city of Nuremberg, then the greatest manufacturing town in Europe, the Birmingham of the Middle Ages, but, unlike our Birmingham, the highest qualities of art were displayed in its metal work.

His father was an able goldsmith, and Albert was his favorite child. "My father," he says, "took special delight in me. Seeing that I was industrious in working and learning, he put me to school, and, when I had learned to read and write, he took me home from school, and taught me the goldsmith's trade." But Albert longed to be a painter, and at length he was apprenticed to Michael Wohlgemuth, the principal painter of Nuremberg. Wohlgemuth's establishment was probably the largest picture manufactory of the time. He also executed a vast number of designs for the wood engravers, especially for the numerous volumes continually issuing from the presses of Antony Koberger, the most enterprising printer, not only of Nuremberg, but of Europe, and Dürer's godfather. In Wohlgemuth's workshops, therefore, Dürer had plenty of practice in drawing for wood engraving, and thus obtained that inclination for the work which has been as fortunate for the world as for his own fame. His paintings, which might have given him a name equal to the greatest of the Italian school, have nearly all perished; the numerous drawings which he executed are shut up in Imperial museums, or in the cabinets of a few wealthy collectors; but his engravings and wood-cuts exist yet by thousands, and have carried his fame to all the world.

After the usual travels (*wanderjahre*) of a German youth, he returned to Nuremberg at his father's bidding, in 1494, to be married, and settled down at once to hard work. In 1498 appeared his earliest woodcuts, the sixteen great designs for the Apocalypse. The northern mind had long dwelt with eagerness on these mysteries of things to come, and among the earliest block books produced in Germany is an edition of the Apocalypse, with rude figures. But Dürer not only transcends all efforts made before him in the representation of these strange promises, terrors, and transformations, these thaumaturgic visions of doom and redemption; the passionate energy and undismayed simplicity of his imagination enable him, in this order of creations, to touch the highest point of human achievement. The four angels keeping back the winds that they blow not; the four riders; the loosing of the angels of the Euphrates to slay the third part of men; these and others are conceptions of such force, such grave or tempestuous grandeur in the midst of grotesqueness, as the art of no other age or hand has produced. From this time until his death, in 1528, he continued to pour forth, with a creative energy that never seemed to flag or to repeat itself, an incredible series of designs, of which nearly two hundred have been fortunately preserved to the world in the

[1] Playing cards are said to have been introduced into Europe by the Saracens, towards the close of the fourteenth century, and some have endeavored to trace to them the first impressions from a wood block on paper or vellum. But it is now known that the earliest cards existing are all hand-painted or stencilled.

popular form of wood engravings. These include, besides the Apocalypse series, the *Life of the Virgin*, in twenty large wood-cuts, the most generally pleasing and popular of all his productions; the twelve folio cuts known as the *Great Passion*; the series of thirty-seven smaller ones distinguished by some writers as *The Fall of Man and his Redemption through Christ*, but which Dürer himself always called the *Little Passion*; also many single subjects, amongst which are some of his finest designs; and, lastly, the gigantic works which he executed for the Emperor Maximilian. This great monarch, fired with a hundred ambitions at once, was anxious that the best artists of his time should be employed to represent him as a hero of romance, successful alike in the chase, in love, and in war, as a wise king, a patron of all the arts, and a successful general. For this purpose he employed, during several years, Hans Burgkmair, Hans Schaeffelein, and especially Albert Dürer, in executing vast designs for wood engraving of triumphal arches, cars, and processions, which, doubtless, he expected would transmit his glory and his fame to future generations. We may form some idea of the labor involved in these designs from the *Triumphal Arch*, which consists of ninety-two separate wood engravings, each more than a foot square, all drawn by Dürer, and which form one large composition about 10½ feet high by 9½ feet wide. The whole subject is a kind of pictorial epitome of the history of the German Empire, representing the succession of the German Emperors, and the more remarkable events of Maximilian's reign, with illustrations of his descent, possessions, and alliances. On this task, so unworthy of his genius, Dürer was engaged, more or less, from 1513 until 1520.

It is difficult to avoid lingering over the life and works of one so personally attractive and so marvellously endowed, but for the present we must refrain, and consider him only as connected with wood-engraving. Until his time wood-cuts were little more than mere outlines. With Dürer they at once became finished drawings in which the light and shade and color were fully expressed. The numerous engravings and etchings on copper, which he executed with his own hand, are unrivalled for marvellous delicacy and minuteness of detail, but he adopted an entirely different style in his drawings for the wood-engraver. The material then used was pear-tree wood, cut, like planks, in the direction of the grain. Large pieces could thus be obtained, but delicate wood-cutting on such a substance was quite out of the question. This necessitated a large and bold style of drawing, coarse indeed to our eyes, yet very effective. Dürer's works, both on copper and wood, were greatly popular from the first over all Germany and Italy. Raphael introduced some of Dürer's figures into his finest paintings, and a famous Italian engraver, Marc Antonio, copied his wood-engravings by wholesale on copper. It was partly to check these piracies of M. Antonio that Dürer made a journey into Italy in 1505.

Hans Burgkmair, of Augsburg (1473–1531), deserves the next place to his greater rival of Nuremberg. That superb procession, the "Triumph of Maximilian," consisting of 135 large wood cuts, the greater part, if not all, of which were designed by Burgkmair, would, of itself, stamp him as an artist of uncommon richness and fertility of invention. He was engaged on this great undertaking from 1513 to 1549, when the emperor died. The work was at once suspended. The wood blocks were cast aside and forgotten, until they were accidentally discovered, worm eaten and injured, and some impressions taken from them in 1796. Such is the vanity of human hopes and aspirations! Burgkmair is a very unequal artist; he often displays great power and originality, but he has not the careful handling and refined touch of Dürer. If, however, some of his pieces are bad, others are superlatively fine, especially "Death and the Lovers," which combines his usual picturesqueness and energy with an Italian feeling for beauty and grace, most rare in early German wood-cuts. This is also one of the earliest specimens known of the chiaroscuro, or tinted wood-cut; an attempt to increase the capabilities of wood-engraving, and to imitate more nearly an artist's drawing, by printing in colors, or tints, from several wood blocks. In this one of Burgkmair's three have been employed. Another fine chiaroscuro by him, the "Emperor Maximilian on Horseback," is printed from two blocks. Burgkmair was also the chief designer employed in the production of "Der Weiss Kunig," the Wise King, another work intended to hand down to future generations the learning, wisdom, and adventures of the Emperor Maximilian, but which remained unpublished until nearly three hundred years after his death.

Hans Schaeffelein, another great artist, who was apprenticed to Dürer, was the designer of the large wood-cuts in the "Romance of Sir Theurdanck," the only one of Maximilian's artistic publications that he lived to see completed. It was first published in 1517. Schaeffelein's powers, however, are better seen in his "Great Passion," a series of wood-cuts published at Nuremberg in 1507, in a book entitled "Speculum Passionis," etc. Many of the designs have a striking resemblance to those of Albert Dürer. The work, however, which best sustains his reputation is "Les Danseurs des Noces," the figures in which are drawn with great spirit and vigor.

We now come to Hans Holbein (born at Augsburg, 1494, died in London, 1543), the last of this great school of artists, who was not only an admirable painter, but also one of the best designers that ever drew on a wood block. This great master ranks next to Dürer in artistic ability, natural genius, and fertility of invention. Nay, in some respects, he surpassed Dürer, as he had a much higher feeling for beauty of form. It has been most truly said of him that none has equalled Holbein in composing an action with the smallest number of figures, and in the smallest possible space. This is well seen in the "Bible Pictures," but especially in the "Dance of Death." These tiny pictures deserve a careful study. They are wonderful for their infinite variety, the dramatic energy of the figures, and the sharpness of the satire. It is a pity that the smallness of the scale on which they are drawn detracts somewhat from their effect. Most fortunately these little gems of design have been cut in the wood with a perfection that has never been surpassed. Of the many able copies made by modern engravers, none approach the originals. They have all the spirit of the master; the drawing is very simple, but every line tells.

The art of wood-engraving was early introduced by the Germans into Italy with that of printing, but no native works of any ability are known to have been executed before 1490. From that date until about 1560 the Italian presses produced many beautifully illustrated works, with designs full of grace and elegance. The second place after Germany must, however, be awarded to France for the number and excellence of its early wood-cuts. Throughout the fifteenth century Paris was the chief centre for the trade in manuscript books. There dwelt those numerous artists and scribes who wrote and decorated the vast numbers of beautiful Books of Hours, Psalters, and other devotional works, which made the French school of illuminators so famous, and of which many copies still exist. The Paris publishers early applied the new arts to furnish cheaper substitutes for these expensive volumes. They had the most exquisite models to imitate, and abundance of artists to furnish the requisite designs; and so well did they employ the advantages they possessed, that in a very few years Paris was the great centre whence Europe was supplied with prayer-books, which have never been surpassed for the beauty of the printing and the decorations. They were usually printed on vellum, in imitation of the manuscripts which they supplanted; and, to increase the resemblance still further, it is not uncommon to find copies in which all the pictures have been painted over in colors and gold, so as to look like miniatures.

When Caxton introduced printing into England, and set up the first press at Westminster, about 1476, he brought with him, also, the new method of multiplying pictures for book illustration. But, though he employed it largely, the best cuts in his books are foreign productions, and the rest such rude things as any clever lad might draw and then cut with a penknife. Such, also, are the embellishments to the works of Wynkyn de Worde and the other early printers. The same may be said of nearly all English books down to the time of Bewick, 1753–1828, before whom no school of designers or wood-cutters existed in England. Thomas Bewick was, indeed, the father of wood-engraving in this country. Nothing could be lower than the state of the art when he appeared. Himself no mean artist, possessed of extraordinary mechanical dexterity, he devoted all his energies throughout a long life to improve his art. He thoroughly understood all its capabilities, and knew how to produce the greatest possible effects with the smallest amount of labor. Some of the birds, as the partridge, the woodcock, and the common duck, in his "Land Birds," are wonderful things in their way, for the perfect fidelity with which he has expressed the plumage and general texture of the bird. Yet his pupil Jackson tells us that he would execute such a cut in less time than a modern French engraver would take to execute the delicate cross-hatchings necessary, according to French taste, to denote the grey color of a soldier's coat. Much might be written, also, on the humor and spirit of the numerous head and tail-pieces which he designed, but they are better seen than described. He also trained quite a school of eminent wood-engravers to whom we owe the present advanced state of the art in England.

JAPANESE DRAWING.

FOREIGNERS are better acquainted with the bronze, porcelain, and lacquer work of Japan than with the simpler drawings on silk and paper; yet in no other matter do the artists show more skill, or attain more pleasing effects. When a fine picture of this sort is desired, the silk is stretched on a frame, and glazed with a preparation of alum, glue, and water. The artist then traces a faint outline sketch with a charcoal pencil, whose lines may be brushed away with ease. If satisfied with this trial composition he proceeds to lay on the colors, or if it is to be an India-ink drawing to cover the silk with hasty blots, which, in good time, assume a surprising coherence and sense. This rapid work is considered the true Japanese style, and is very fashionable just at present. But to enjoy it a certain education of taste is requisite, and as this has to be cultivated at the expense of nature — who does not work hurriedly or in black and white — I prefer to preserve the foreign liking for the better finished and brighter color pieces. These relate mostly to bits of ideal landscape bathed in that "light that never was on sea or land," courtiers in the gorgeous robes of the past, and especially flowers and blossoms visited by insects and birds.

Of course, we expect to find the processes of drawing the reverse of our own. In painting landscapes, for instance, the artist begins with the foreground and retreats until he reaches the mountains and the moon in the background. In India ink the artist generally makes the middle distance first, afterward diluting his preparation so as to leave a fainter mark for further distance, and finally bringing out the full design by a few spots of intense black. In one charming sketch in black and white, which a leading artist drew for me, of a bird resting on a broken stem of lotos in a pond of pads, he first made a few faint trial lines, then completed the figure of the bird; went on to draw the broken stem and the leaf drooping in the water, and then the more general view of the pond. A grotesque grub, toiling up the leaf, supplied the element of whimsical humor so common in every species of artistic composition in this country.

These paintings may be either large, and in that case they are mounted on strong paper or cloth and hung upon the wall, or if smaller, are pasted into albums, whose leaves open on the principle of screens. It is also the fashion to send a blank album to a painter, with the request that he fill one or more sheets with a characteristic sketch, and thus in time an interesting collection can be gathered of representative work by the best of one's favorite artists. Or a person desiring such a gallery may send sheets of silk to those artists whose skill he wishes to enjoy, and thus obtain an album. And very often beautiful sketches may be found for sale in screen shops or on the streets.

Many of the conventionalities that surround Japanese art are old and interesting. Certain rules of perspective are followed, though no correct system is known. The representation of scenery is gov-

erned by a code of lines and dots, which are fancifully designated, and are minutely described in native art treatises. The use of these approved means of delineation distinguishes between the artistic schools or "sects."

Not only do the manuals prescribe rules for the representation of objects, but they set before the artist a schedule of themes sanctioned by classic use, in both Japan and China, which are to direct his own invention. Some of these subjects are quaint and suggestive, such as peach-trees in blossom, with here and there a cottage and willows; a company listening to the distant music of a fisherman singing in his boat among the willows; rustics carousing, with landscape background; a flight of wild geese at twilight; a mountain forest ruined by a winter's gale, and mountaineers returning home down a defile at sunset. These are but specimens of a long list; and beside the catalogue of themes there are others which apply a similar method to the treatment of single details in a composition. Thus one author gives a list of the hundred phases of the plum blossom. There is, moreover, a class of pictures which may be styled pictorial compliments, as they express or suggest congratulation or flattery. Thus a stork flying and screaming in the sky symbolizes fame. The peculiar constitution of the national language, or rather languages, which gives such a scope and perfection to the pun, results in a mass of these curious double-enders. But I pause, lest by thus glibly discussing this topic, I fall under the scorn of the native author whom I have so freely used, who says, "It is very easy to talk art, and some there be who are learned critics without being able to draw a line, or may be they can make leaves of grass and the chrysanthemum." — *Letter to the N. Y. Evening Post.*

COMPETITIONS IN INTERIOR DECORATION.

NO. IV. A CHIMNEY BREAST AND STONE FIREPLACE.

The subject for the fourth competition is a chimney breast and stone fireplace situated at the end of a dining-room in a city house. The room is thirteen feet in the clear, and is sixteen feet wide; the chimney breast is five feet wide; the fireplace may be used for wood or coal fires. Required half plans, taken through the fireplace and above the fireplace, an elevation and section, with details to a larger scale. The making of a perspective of the end of the room is left optional with the competitor. The drawings should be received at the office of the *American Architect* on or before June 27.

NOTES AND CLIPPINGS.

The Wages Matter. — With this week's issue we present to our readers as a new and permanent feature of our journal a tabulated statement of the day-wages paid in the various building trades in the chief cities of the country. This table will be found on page iii of the advertising pages.

Machinery Hall, Philadelphia. — A very amusing illustration of the saying that what is everybody's business is nobody's business has come to light in Philadelphia within a few weeks. At the close of the Centennial Exhibition, Machinery Hall was not taken down, because, amongst other reasons, the Philadelphians were confident that the Permanent Exhibition would be a great success, and that it would ultimately expand into Machinery Hall. As there was no likelihood that it would be needed immediately, a body of watchmen was put in charge of the buildings, and wages aggregating about two thousand dollars were paid them. As might be perhaps inferred from their actions, these watchmen were ward-politicians, who were appointed to the places in payment for services at election times. At first they were very zealous and made many arrests, and having thus lulled any suspicion of their honesty that might be entertained, they began and have continued up to this time a systematic course of depredation upon the property left in their care. The park guards and people in general who saw cart-loads of iron rails, wooden counters, tables, machinery, boards, etc., leaving the building, supposed that it was all done under warrant from those in authority, and never interfered nor reported the fact to the city officials. The result is that the great building has been pretty thoroughly stripped of all that was portable and salable, and all that is left is the mere shell of the building.

In Danger of a Flood. — The Boston *Advertiser* says that the inhabitants of Mill River Valley, particularly of Williamsburg, have been much alarmed by the suspected unsafety of Goshen reservoir, the summer supply of the mills on that fatal river. In response to a petition, the county commissioners examined the reservoir Saturday, May 11, together with many citizens. They will order the flash-boards to be removed, and other precautionary measures. Many families have long kept watch all night for an expected flood.

The Old South Church. — It is said that of the $100,000 required to save the Old South Church, Boston, the sum of $158,000 is still to be raised.

Strange Sinking of Land. — A little village in the neighborhood of Dunquignan, France, has lately been the scene of a remarkable subsidence, which has attracted the curious from all directions. An elliptical tract of ground, containing over ten thousand square feet, sank gradually one day, accompanied by loud noises, until it left an orifice of over one hundred feet in depth, with water at the bottom. Numerous trees and vines disappeared completely in the new lake. A similar depression on a smaller scale occurred in the same vicinity a century ago, and both the phenomena are attributed to the action of subterranean streams. — *Nature.*

The Strength of Wrought Iron. — The New York *Tribune* says that a series of experiments has been carried on at the Washington Navy Yard, by Commander L. A. Beardslee, of the United States Test Board, to ascertain the strength of iron used in chain cables. It had been suspected, with just reason, that the British admiralty tables for the strength of wrought iron needed revision. Not less than two thousand tests of the tensile strength of iron have been made at the Navy Yard, to determine the elastic limit, elongation, and reduction of area of the various specimens; and forty-two complete chemical analyses have also been performed. Some of the conclusions which have been reached are remarkable. The admiralty tables are declared unsafe, and new ones have been prepared. The board finds that the tenacity of two-inch bar for chain cables should be between 48,000 and 52,000 pounds per square inch; one-inch bar, between 50,000 and 57,000; and that stronger irons than these make inferior cables, because they have less ductility and capacity for welding. The strength of wrought iron and its welding power are influenced quite as much by the reduction it has undergone in rolling as by ordinary differences in its chemical composition. In general, the processes for making wrought iron give an uncertain quality to the product, while the methods of making cheap steel confer certainty and uniformity. The ordinary practice of welding is capable of great improvement, by being performed in an atmosphere freed from oxygen. The importance of the subject will be conceded, since the safety of human lives must often depend upon the strength of a ship's cable, or of the links in a bridge chain.

Historical Buildings in Holland. — We learn from *La Semaine des Constructeurs* that a commission has existed for some time which is charged with the preservation of the buildings of the kingdom which are valuable from historical, archæological, or artistic points of view. It has proved its value by saving from destruction such works of art as the Gate of the Captives at The Hague, the fine feudal castle at Muiden, and the superb bronze *grille* at Haarlem. Its powers seem to be quite absolute, for when the state has appropriated money for the restoration of any building it can apparently make what changes or additions it pleases to the plans presented for approval by the local authorities. Moreover, the right of absolute veto resides in it. This body has latterly thought it advisable to print, for the instruction of the public, reports of its proceedings under the title of *Communications de la Commission pour la Conservation des Monuments historiques et artistiques du Royaume.* The first issue contains the royal warrants under which it was formed; the instructions addressed by the commissioners to provincial authorities, whether lay or ecclesiastical; and the reports of the members themselves, illustrated by plates, which show the buildings reported on.

French Strikes. — The history of strikes shows that soldiers may be useful in putting an end to strikes by other means than by force of arms, although in the more peaceable way they are as likely to incur the ill-will of the people quite as much as if there had actually been a trial of strength between them. When in 1865 the journeyman hatters of Paris struck, an order of the day was read in all the barracks to the effect that all soldiers who were hatters by trade should have leave of absence provided they would fill the places of the strikers for the wages offered by the masters. A strike of the hackmen that took place in Paris that same year was brought to an end in a very few weeks by detailing soldiers to fill their places.

A Novel Brick Kiln. — Stories are common enough of machines which receive a live pig at one end and deliver him in the shape of sausages and salt pork at the other in incredibly short time, but to believe that a car of moist bricks can be pushed into a kiln, and in four or five hours be drawn out at the other end perfectly baked and cool enough to handle, requires an effort. Yet it is said that at Normanton, England, Mr. Foster has such a kiln, and that it works perfectly. The kiln is a little more than one hundred feet long and is only eight feet broad. Through this kiln is laid a track, on which travel iron cars, whose iron-work is protected from the fire by burned clay, by the current of fresh air which is drawn under them by the draught, and by not being fully exposed to its fury, in that the cars are on a lower level than it. This fire is in the middle of the kiln, on either side of the track, and as the chimney-flue is at the entrance end, the fire is drawn to meet the entering car, with its load of five thousand raw bricks, and thus gives them a preliminary drying and baking before they are exposed to the full heat of the fire, and also allows them to begin to cool off as soon as they have passed the middle. The kiln will contain nine cars, — or, in other words, 45,000 bricks, — and as the bricks are unloaded from the cars directly into wagons, the progress of the line of cars is slow enough to allow the bricks to cool thoroughly after passing the fire. There seems to be very little heat wasted, for the cars are just the width of the opening of the kiln, and their load of bricks reaches quite to the top of the arched passage. At any rate, as the cost of burning one thousand brick is said to be less than six cents, the process cannot be called an expensive one.

Paper Shutters. — The latest application of paper to building purposes is the manufacture of window-shutters, for use in places where the dilatation and contraction of the metal would make the use of iron shutters undesirable.

A Question of Domicile. — A Douai tribunal has decided a case where a house was built across the border-line of two communes, half in one, half in the other. Its residents were declared inhabitants of the commune on which the front door opened.

The Manufacture of Portland Cement. — Portland cement is made near Rochester, England, in this way: Gray chalk is intimately mixed with one fourth of its weight of clay in a pug mill supplied with warm water, and is then run off into a settling-pond, where the superfluous water is removed. The sediment is dried on a floor specially constructed and provided with flues, then burned in a kiln, and lastly, ground between millstones.

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A RATHER amusing instance of the official disposition to temper justice with thrift, is the report of the Committee on Claims of the National House of Representatives on the bill for the relief of Mr. John Fraser, architect. More than ten years ago, when the building of a new jail for the District of Columbia had been undertaken, complaint being made to the Government that the contract for the work had been improperly awarded, the House of Representatives directed its Committee on Public Buildings and Grounds to investigate the matter, giving authority to send for persons and papers, but with the proviso that no expense should be incurred in the investigation. Mr. Woods, then chairman of the committee, accordingly summoned Mr. Fraser from Philadelphia, and requested him, with two other experts, Mr. Oertly, Assistant Supervising Architect, and Mr. Grant, architect and builder, to make a thorough examination of the plans furnished by the architect of the jail, to report on their completeness and fitness, to make a careful estimate of the rest of the building as planned, and of any additions that might be required; to revise the specifications, and inspect the work and material already furnished; to report on all these particulars, as well as on the fitness of the site chosen for the building, and the propriety of the contract awarded. Mr. Fraser left Philadelphia and went to Washington. An elaborate written report was rendered to the committee, in consequence of which the contract was rescinded, and the building abandoned. Mr. Fraser, however, received no pay for his services, then or since, and a bill has been introduced in the present Congress for his relief, awarding him three thousand dollars as compensation.

THE Committee on Claims, to whom the bill was referred, now reports that the claimant faithfully carried out the instructions, leaving his home and neglecting his private business; that his testimony was valuable to the Government, and aided the committee greatly in discovering many irregularities, in consequence of which the building was abandoned and the Government protected against great frauds, and that his work required much labor and professional skill. The committee, moreover, reports that, as appears, the ordinary compensation for such service is from one to two per cent on the cost of the work measured and valued, "according to the nature of the work done;" that the total estimate was $408,672, one per cent on which is $4,038.72, or about $1,300 for each of the experts; that it was in evidence that from $1,200 to $1,500 was a fair payment for the work done by the claimant; and that although the resolution of the House which authorized the investigation stipulated that no expense should be incurred, this proviso, which it did not appear that the claimant knew, should not prejudice his just rights. After this we naturally expect to see the committee recommend the payment of at least the $1,300 which it computes, with perhaps some allowance for the ten years' delay and the expense of bringing forward his claim. But no: the committee remembers that Congress authorized the building at a cost of $200,000, and reckons the compensation of the experts at one per cent on this sum, as $2,000, or $666⅔ apiece. By way of hitting a conveniently round sum it drops the odd sixty-six dollars, and thinks that the six hundred is but a just compensation. It therefore amends the bill by substituting six hundred for three thousand dollars, and recommends its passage in this form. We know nothing of the history of Mr. Fraser's claim, nor of the value of his services to the Government, nor whether they were of any value at all; but we doubt whether any explanation of it can give cohesion to the committee's report. The committee admits the rule of one per cent on the estimate of cost. If it thought that the experts' estimate was exaggerated, and unduly increased the rate of compensation, this was one thing, and the committee might have been expected to say it. The estimate of Congress was another matter, and concerned only the persons who had charge of the building. If the jail was planned so as to double its cost, this increased the value of the services of those who estimated it. To suppose that either this value or the labor performed would have been different if the Congressional estimate had been increased to half a million, or reduced to half a thousand, is to ascribe an efficiency to the words of Congress which the non-congressional mind does not easily recognize. The report of the committee might have been of some usefulness beyond its immediate occasion if it had distinctly recognized a principle and carried it out to its legitimate consequence. As it is, it is more in keeping with the off hand give-and-take decision of the average juryman than suited to the clear deliberation of the highest authority in the land. The decision would be of little consequence to anybody but Mr. Fraser, were it not that it is a fair illustration of the tendency which besets men and bodies of men, when once they are released from superior control, to look upon the satisfaction of even a just claim as a gratuity or charity, and to fancy that there is no reason why they should not give anything they see fit, — a tendency which does not command respect, but appears in more ways and places than we should like to count.

THE report of Collector Smith, concerning his investigation into Mueller's performance of his contract for the stone-work of the Chicago Custom-house and Post-office, which has got into the papers, makes out a bad case for Mueller, and, by implication, for some of the persons concerned in the supervision of his work. We have already referred to the accusations against Mueller (*American Architect*, May 4, 1878). The Collector says that only the cutting of the attic and chimneys has been looked into, there not being time to go back over the whole work, but that the inquiries which have been made show that "from the beginning to the present time, there has been the most shameless disregard of public interests and the constant adoption of adroit methods for robbing the treasury." Testimony shows the employment of all kinds of devices to increase the time spent on the work. The allowance in the original contract of a half inch extra on each face of the stones for quarry-sizes the assistant district-attorney thinks to have been fraudulent, as well as the supplementary contracts which allowed extra compensation for hauling stone. An allowance of thirty-five cents per foot was also made for sawing, the contractor being left to judge what sawing was necessary, and the consequence being, says the attorney, that he put in an enormous amount of sawing when rough cutting at twelve cents per foot would have done as well, by which the Government paid unnecessarily forty thousand dollars extra. A number of experts have estimated that for work which is charged to the Government at twenty-five thousand days, eleven thousand days' work ought to have sufficed. These malpractices and sharp dealings, he thinks, must have been known, or ought to have been known, by the superintendent and at the Supervising Architect's office. He therefore charges all the persons who administered the work for the Government with gross negligence or fraudulent collusion. For the truth or error of these accusations we must await the result of the examination by the Secretary of the Treasury.

THE good work of destroying unsafe buildings still goes on in New York, though unhappily at the cost of repeated loss of life. The last case is that of the Sixth Avenue car stables, where the third floor, on which a large amount of grain had just been stored, gave way as the men were spreading the load evenly upon it. It is said that ten thousand bushels of grain

were piled upon a space of twenty-three by eighty-five feet, thus loading it with about one hundred and seventy pounds to the square foot, while the floor was only capable of bearing one hundred and twenty pounds. The floor first sagged, and then, as the grain poured into its centre, gave way entirely, and carried down the two floors below into the cellar. Fortunately nobody was under it; but the men who were spreading the grain went down with it, and two of them, who were buried in the grain, were suffocated before they could be got out. Apropos of this and other such disasters, the *New York Tribune* suggests the question whether nothing can be done to prevent them in future. There is only one remedy, we believe, which has been found effectual, that is, to punish the persons who are responsible for them.

In the light of such accidents there was a special interest in the discussions which have lately occupied New Yorkers, as to whether the new East River Bridge was strong enough for use by horse-cars or railroad trains, or whether the people of Brooklyn would have, after all, to cross it on foot or keep to the ferries. The Committee of the Board of Trustees appointed to consider this question has reported the assurance of their engineer that the bridge is built to carry a distributed load of eleven hundred tons, which is the equivalent of thirty six Pullman cars, and that it will be perfectly safe with a moving load of three. The question has been raised whether, on account of the exposure to violent winds, it would not be necessary for the stability of cars to increase the gauge of any road that crossed the bridge to six feet, which would have made it necessary to run special cars on it with a change at each end. In answer to this the Committee says that the trusses of the bridge will give sufficient protection, and the Trustees have accordingly fixed upon the ordinary gauge of four feet and eight inches.

The American Society of Civil Engineers will begin its tenth annual convention in Boston on the eighteenth of June. The convention will hold its sessions in the mornings and evenings of the 18th and 19th, using the afternoons for visits to various objects of interest in and about the city. For the 20th and 21st, excursions are arranged in Boston harbor, and to Lowell and Lawrence, the annual dinner being on the evening of the 20th. It is proposed to visit, on the 22d, either the Mount Washington Railroad or the Hoosac Tunnel. Among the topics of interest which are proposed for discussion at the convention we notice the following: The South Pass jetties, the levees of the Mississippi and their crevasses; a new method of detecting overstrain in iron and other metals; the law of tidal currents; the nomenclature of building-stones and stone masonry; brick arches for large sewers; the preservation of timber. The Boston Society of Civil Engineers, the Engineers' Clubs of the Northwest, of Philadelphia and of St. Louis, have been invited to take part in the convention.

MR. SCHLEICHER'S GOVERNMENT BUILDING BILL.

The printed text of Mr. Schleicher's bill for the completion and erection of certain public buildings differs materially from the account of it given in the papers, to which we called attention some weeks ago (*American Architect*, March 23, 1878). The bill is drawn with a good deal of care, and contains some rather remarkable provisions. It authorizes the Secretary of the Treasury to issue perpetual bonds, redeemable only by purchase in open market, to the amount of forty millions of dollars, the proceeds of which are to be the public-building fund of the United States, and to be used for no other purpose. The bonds are to bear interest in coin of the present standard value at four per cent, and to be sold at not less than par in coin. Out of these forty millions about eighteen are assigned in fixed sums for the completion of the various buildings now in hand, the chief appropriations being five millions for the State, War, and Navy Departments in Washington, three and a quarter millions for the Cincinnati post-office, three millions for that at Philadelphia and two for that at Boston, a million and a half for the Chicago post-office, and a million six hundred thousand for the St. Louis custom-house. It also provides for building twenty-four new buildings, post-offices, court-houses, and custom-houses in various smaller cities throughout the country, the appropriations ranging from seventy-five thousand dollars to two hundred thousand, on the condition that where sites for them are not now owned by the United States they shall be given for the purpose. About twelve millions more are appropriated for new buildings, for which the Secretary of the Treasury is empowered to select and buy sites, or, if need be, condemn and take possession of them, being assisted in each case by a commission of three disinterested persons in each place, whom he is himself to appoint. The chief appropriations for these buildings are two million dollars for a post-office in Baltimore, five millions for a custom-house in New York, one million each for post-offices in Brooklyn and Pittsburgh, a million and a quarter for appraisers' stores in New York, and three quarters of a million for the like in Boston. All these appropriations are to be immediately available for use under the Secretary of the Treasury. Finally, about five millions are appropriated for buildings in Washington: three hundred thousand for the extension of Winder's building for the use of the War Department; three hundred thousand for a Coast-Survey office: half a million for a fire-proof building for the public archives; the same for "a plain, substantial, fire-proof building" of brick for the Bureau of Engraving and Printing; a quarter of a million for a fire-proof building three hundred feet square, to serve as a National Museum, to be placed on the grounds of the Smithsonian Institute, and built according to plans already on file with the joint committee on public buildings and grounds; and three million for a new building, or for an enlargement of the Capitol, as may hereafter be determined, for the accommodation of the Congressional Library.

The provisions of the bill bid fair, if it is passed to revolutionize the architecture of our public buildings. The Secretary of the Treasury, the Postmaster-General, the Attorney-General, the President of the American Institute of Architects and the Supervising Architect of the Treasury Department are made a commission to select plans for the post-offices, custom-houses, and other buildings outside the capital, provided for by the act, as well as for the Coast Survey building and the building for the public archives. They are to call for such plans by public advertisement, requiring elevations, floor plans and sections to be submitted in competition under whatever rules they may propose, and are to choose the materials and determine the question of fire-proofing for each building. They may call in to assist them such disinterested experts as they desire. In like manner the President of the Senate, the Speaker of the House of Representatives, the two chairmen of the joint committee on the library of Congress, the chairmen of both committees on public buildings and grounds, and the Librarian of Congress are made a commission to select a plan for the accommodation of the Congressional Library. They are to call for plans of alterations of the Capitol for this purpose, and also for plans of a separate library building, and shall decide on the best plan for this purpose; in doing which they also may call in such expert assistance as they see fit. If they decide that it is best to find accommodation for the library in an extension of the Capitol, they are to so report to Congress, with their recommendation of a plan and estimate of cost. But if they decide on a separate building, they are empowered to select a site for it in one of the government reservations, or otherwise; and if a site is chosen which does not belong to the Government, the Secretary of the Interior is directed to purchase it, or in default of a satisfactory agreement with the owner to condemn it and appropriate it in the usual way; after which he shall build the library according to the plans drawn by the commission.

We do not know what chance there is of the bill becoming a law or how much alteration it may receive if it is passed: that it has got so far as to be printed is at least something in its favor, and so far as we have seen it noticed in the press it has been with approval. One can fancy the flutter that its passage would cause among a profession which in the prolonged depression of all kinds of business has been more than commonly cast down. It is not our province to discuss its fiscal aspects, or to consider how fast the irredeemable bonds are likely to be disposed of at par in coin. The provisions which seemed to us objectionable in the first reports of it do not appear in it as printed. There is no attempt to regulate beforehand the way in which the work shall be put on the market. So far from assuming to finish up the great amount of building proposed in it within the year, the bill says nothing about any limit of time, but leaves this for the natural working of circumstances. There is enough laid out in it to occupy ten years, and it is better that it should do so.

A reading of the bill suggests that it must have been prepared in consultation with some professional authority, for it shows a regard for the position of the architects whose plans may be adopted that is unusual in such documents. The building for the library of Congress is to be carried on under superintendence of the selected architect, and for this a special compensation is to be fixed, unless he prefers not to superintend it, in which case an officer of the Engineer Corps is to be detailed for the purpose. No changes shall be made in execution which involve a change of the purpose of the architect without his consent, except by authority of the Secretary of the Interior, and this authority is not to be given until after the architect has been consulted concerning the changes. There is a similar provision in respect to all the other buildings for which designs are to be got by competition.

The fees of the architects to be employed on the various buildings are fixed with a precision which is probably for the advantage of the profession, considering the tendency of all committees to abate its compensation. There is a carefully graded scale both for premiums and commissions. The accepted drawings in any competition are to receive a premium which is to be one half of one per cent when the estimated cost of the building is not more than two hundred thousand dollars, a third of one per cent when it is between that cost and half a million, a quarter when it is above half a million. The commissioners are empowered in each case to pay such other premiums, to designs not adopted, as they may consider them to deserve. In the same way the architect's fee for working plans, detailed drawings, and specifications, which in all cases is to be in addition to what he receives as premium, is fixed at three per cent (making therefore really three and a half) for a cost of two hundred thousand dollars or less, two and a half for a cost between that and half a million, and so on decreasing, two per cent between half a million and a million, one and one half from one million to two millions, and beyond two millions, one per cent. By this scheme, the superintendence being a separate matter, the fees for the buildings of lower cost are all that could be fairly asked; but the rate of compensation diminishes with the increase of cost much more rapidly than is in accordance with usage or than we think reasonable, although perhaps it is in this respect all that can be expected from a government whose settled policy it is to be liberal in all its stipends of lower grades and narrow in the higher ones.

The architect's labor and his expenses do not, it is true, increase as fast as the cost of his buildings, but they follow it very rapidly, nevertheless; while his responsibility and the importance of his service increase *pari passu* with the cost, and according to those also he ought to be paid. The fee for the architect of the Congressional Library according to the bill would be one and a quarter per cent on (say) three million dollars, that is $37,500. It would take pretty much all his time for four or five years. If he were an architect of the best class he would be likely to spend two thirds of this fee in office expenses, and there might remain to him twenty-five hundred or three thousand dollars a year for his compensation. A literal construction of the terms of the bill would lead to some curious anomalies in the sudden diminution of the fees as each successive limit was passed. Thus if the Baltimore post office, for which two millions are appropriated, should be found to cost one million nine hundred thousand, the architect's fee, being one and a half per cent, would amount to $28,500; which if it cost two million one hundred thousand, the fee at one per cent would be only $21,000, and it would not be till the cost had reached nearly three millions that he would recover the compensation due him before it passed two millions. Strictly speaking, in fact, an increase of five dollars in the money spent on the building at the critical limit might strike off at once almost ten thousand dollars from the fee. This severe discipline, severer in truth than that which awaits the sharply curbed architect of the Indiana capitol, might prove an effective restraint on the exuberant imaginations of architects, but it can hardly have been intended by the author of the bill. It would naturally be avoided by the provision, which is usual, of computing in each case the full compensation up to the first limit, then adding the reduced per centage for the excess up to the second limit, and so on.

There is one respect in which the bill is likely to find more or less disapproval among architects. The superintendence of the Congressional Library, as we have said, is to be offered to the architect whose design is adopted; but in case of most of the other buildings, such as are by law and custom placed permanently under care of the Supervising Architect, the plans, detailed drawings, and specifications are to be filed in his office and the work to be carried on under his superintendence. A proposition like this, included in the bill to establish a Bureau of Architecture which was proposed in the Treasury Department two years ago, and which was stifled in Committee, called out a good deal of energetic criticism from the profession. There are difficulties in the way, certainly; but we are inclined to think that the method proposed in the bill is as a general system the best one, and a general system there must be. The difficulty of finding capable local architects in many places where the work must be done, the inconvenience of getting proper supervision from distant architects, the desirability of securing a uniform standard of excellence in workmanship, the value of a uniform system of supervision, and the need of a regular record of the progress of all the work, — all agree in making a central superintendence desirable. An arrogant or meddlesome Supervising Architect might, it is true, make things very uncomfortable for the designing architect; but so may, and does, an arrogant and meddlesome client. The Government, like another client, has the right at the last resort to have its work done as it pleases, and to watch it as closely as it pleases, — is bound to watch it closely, in fact. This provided for, the step to the assumption of the whole superintendence is a short one; it ought to be possible to take it at less cost than to provide supervision by the individual architects, and to secure on the whole a better as well as a more uniform result. The opportunities of the Supervising Architect to interfere injuriously are pretty well taken away by the clause which forbids him to make any changes against the wish of his fellow. The provision, which is a necessary consequence of the other, that drawings must be given to the Government and filed in the Supervising Architect's Office at Washington is a necessary consequence of it, for without them the supervision could not be carried on. This is an inconvenience, requiring each architect to make complete duplicates of all the working drawings for preservation. It leads to some rather difficult questions, and would have to be carefully watched to see that it did not invalidate the established usage, which we hold to be important, which maintains that in all ordinary practice the drawings are the property of the architect, and not of the client.

NOTICE OF THE THIRD COMPETITION IN INTERIOR DECORATION.

THIS competition is based upon the following programme: "The subject of the third competition will be a portion of a dining-room wall between two windows which are twelve feet on centres, the room being fourteen feet in the clear. As the problem is essentially a problem of surface decoration the dado and frieze, if employed, should in treatment be properly subordinated to the wall."

It is obvious that a design of wall-decoration, unless purely structural in character, is incomplete without color, and the application of colors is practically inconsistent with the conditions of these competitions. The competitors therefore have labored under the disadvantage of being compelled to rely upon contrasts of "names" in black and white, assisted in some cases by descriptive statements of their intentions as to the color treatment. The absence of such descriptive statements in many of the drawings renders it impossible for us to make such full comparisons and criticisms as, in justice to the competitors and for the complete fulfillment of our scheme, we should wish to make.

The committee of architects, who have been good enough to examine these competitive drawings, have awarded the first prize to that bearing the signature of "*X. Y. Z.*" This design, which is exhibited in a well-executed drawing, presents a panelled dado and paloted wall-screen, similar in vertical dimensions, and, together, occupying the whole height of the wall to the top of the window architraves, which are well composed in English Renaissance. Above is a broad frieze. The panels of the dado are decorated with an arabesque upon a dark ground, those of the dado-frieze with vegetable forms more freely treated upon a similar background. The screen, in the spaces between the windows, is divided into three vertical panels, containing each a different composition of natural leafage well distributed over the surface, bordered at top and bottom with a good contrast of horizontal lines and frets; in the centre of each panel is a small medallion with birds. This wall-screen is by far the best part of the design. The length of frieze given in this drawing bears two peacocks, two bits of foliage in pots, four flying birds, and a central conventional sun, all after the manner now recognized as that of Queen Anne. These are distributed on a white background horizontally divided by two lines, suggesting variations of tint. The cornice is not commensurate with the rest of the decoration in importance. The frieze is wanting in continuity — too scattered and

capricious in his treatment, and the lower part of the peacocks would be invisible from any point in the room. The similarity in the dimensions of the two principal divisions of the wall-surface is not saved by the dado frieze, and is fatal to harmony of proportions. The sconces are out of scale. The absence of any suggestion as to color or material leaves us in ignorance of the principal decorative *motif* of the design, for it is one which may be saved or lost by a small variation in contrast or harmony of tones. This study was reproduced in the last number of the *Architect*.

"*Bay State*." This composition, which also appeared in the last number, received the second prize. It is the only design entirely in panelled wainscoting, and is handsomely set forth in the drawing. It has deeply embayed windows (if splayed they would have opened into the room more cheerfully), no distinctive dado, a panelled frieze, and an enriched cornice with delicate ceiling-beams and pilasters. The arrangement of panels in the wall-screen is effective and not without ingenuity, and the carving in the panels is well placed, well designed, and well drawn. The composition is rich but temperate, a combination of qualities not common even in the work of more experienced hands. The room is small for its height of fourteen feet, and this disproportion is not remedied by the predominance of vertical features, which narrowly escape the charge of thinness. But on the whole it is a clever study and the details are excellent.

"*Inconnu*" received an honorable mention. He has fallen into the error of dividing his wall-space into two equal divisions by a central horizontal line. It is difficult to imagine a treatment of color or detail to palliate this oversight in the first laying out of the work. Below this dividing line is a well-drawn composition of figures and a dado. The wall-screen is a vine upon a geometrical basis of lines, and the frieze, which is separated from the rest of the wall surface simply by belts of color, is made up of quadrants and radiating foliage arranged in squares — an arbitrary and eccentric device which does not assist in giving harmony to the design; the movement of it is too positive for so large a feature, and the cornice is without design, suggesting no sufficient relations of wall with ceiling, — an important point of omission and one in which the designer has the companionship of the majority of his competitors, notably of the first named in this list. This design is principally remarkable for the figure-subject introduced, to which we have already referred; but the subject is put too low upon the wall for good effect, and its position is inconsistent with the placing of furniture. If the leading motive of the decoration is to accommodate the picture, it should have been placed immediately above the impost line, where, being merely decorative in its character and function, it would play its due part in the composition and accomplish a harmonious adjustment of wall-spaces. As it is, the impost line is marked in the wall-screen by a Japanese inversion of colors, the light and dark above the line becoming dark and light below. The design is said to be "based upon the form and colors of the Garden Japonica," but how these colors are disposed and upon what grounds is not stated.

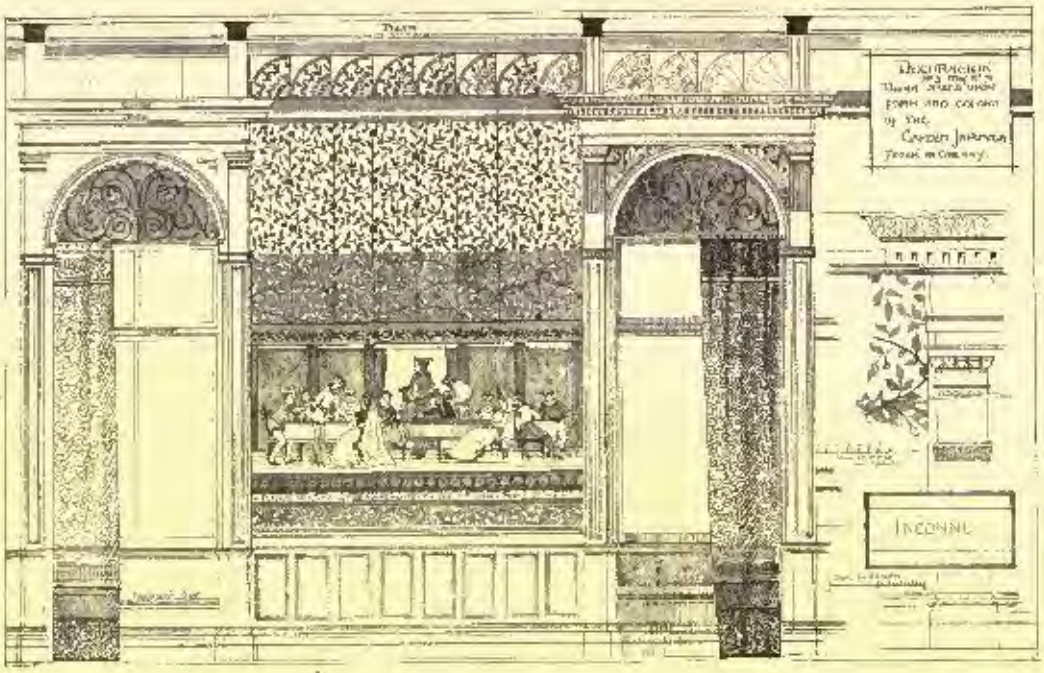
"*Voltaire*." In this design the wooden dado and carved window architraves are built up with a daring combination of walnut, cherry, and holly, a combination which the architectural detail cannot carry without becoming disjointed and meaningless; the holly in especial, in the ample proportion in which it is introduced, would be an element of discord in any scheme of color except one in which white is intended to predominate. There is a frieze, which, with its architrave moulding below and its plain dentilled cornice above, is unhappily equal in width with the dado proper. The frieze and field are alike occupied with a fine reticulation of lines at right angles, traversed transversely and in a northeasterly direction by a curious mass of separate twigs, irregularly scattered, but all moving violently in the same direction, as if blown by a sort of decorative hurricane. These twigs are to be in red, yellow, and gold upon a light yellow field, and the field is surrounded with a border of Pompeian red bearing a yellow fret. The idea is original and there are good points in the design, but in its leading features it is far too original to be safe, and the movement suggested is fatal to repose. The method of covering the wall-screen is indicative of a caprice, and the caprice is carried into execution without the assistance of a knowledge of natural forms, which alone could justify it. As regards color, the white of holly, the red of cherry, the brown of black walnut, cannot be combined with such a color as Pompeian red without a discord which only a very liberal use of dividing black lines could mitigate. This effort is a brave one, but too ambitious. We reproduced it in the last number.

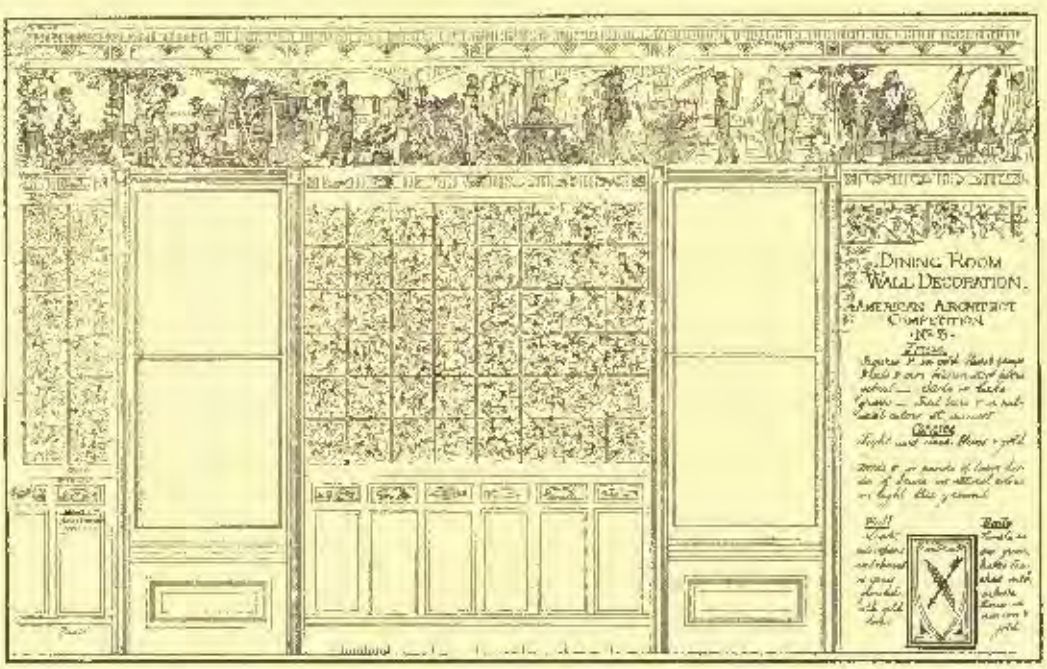
"*Minus*" has started with the same theme as "*Inconnu*," a decorative picture, in this case a landscape — extending from window to window just above the dado; and there is indication that the same motive is to be carried around the room. The objection to this arrangement is patent: the main object of interest is below the level of the eye and must interfere with the disposition of furniture. The treatment of the picture itself would be good for a frieze and, if so placed in this design extending from cornice to windows, the wall-space would be more harmoniously divided than at present. The screen is divided into squares of six inches, occupied in the Neo-Jacobean fashion by a geometrical recurrence of rosettes, conventional leafage, quadrants, and a woven pattern; if well treated as regards color this pattern would be effective. The frieze is composed of a succession of similar masses of natural leafage upon a light ground; the succession is bad, but the idea of opposing the stiffness and formality of the screen-treatment by freedom of movement in the frieze is good. The dado is extravagant in design and freakish in its suggestion of color; it forms a most uneasy base for the picture, and is an instance of design misbestowed. As the wall-treatment above is essentially one of color and not of form, we need in the dado either a panelling of wood or a plain neutral color. The value of repose at this point is very evident. Another curious instance of design misbestowed is in the subjects painted *under* the windows, where, in execution, they would be absolutely lost.

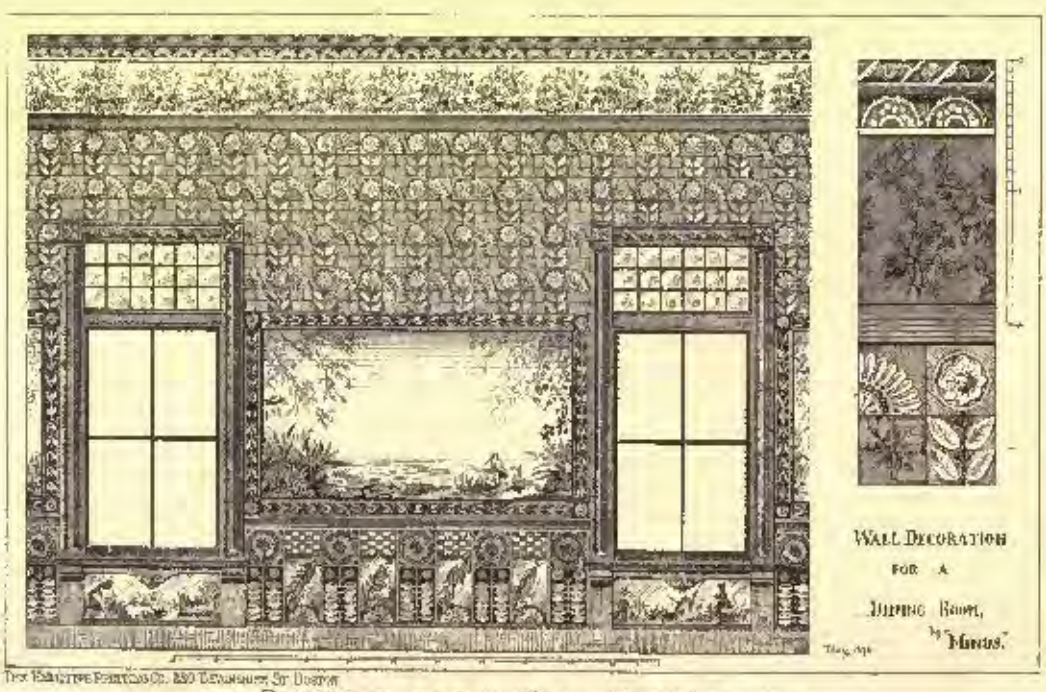
"*Tom Pinch*" sends a study which is in the nature of a diagram for color, and he gives to the question of color more consideration than most of the others. The wood-work is in oak and the treatment is mediæval. Pilasters flanking the windows support ceiling-beams, and are crossed on the lintel line by a horizontal beam which forms the lower member of a coved cornice. There is a dado panelled with butternut sheathing, which sheathing, by the by, being only one and one half inches wide, gives a false scale to the design. The dado has carving in little tympana under the capping, very ingeniously managed. The engraving on the pilasters is capricious, cheap, and harmful, but in other respects the wood-work is well designed and indicates good training. As regards general proportions of wall surface, this composition, if less original than many of the others, gives evidence of a correct feeling, which is an excellent basis of success. To start with a bad proportion is to place upon the subsequent study of decoration an unnecessary burden of extenuation. The wall-screen is a modest and safe arabesque damasked upon "dull bluish green" with narrow chocolate style and gilt bead, — an intelligent arrangement. The lower part of the wall-screen is of "maroon-colored embossed leather stamped in black and gold." The transition between these two features, which are violently opposed in texture, color and form, is not properly managed. Indeed it would be difficult to contrive a sufficient line of demarkation between surfaces so antagonistic; moreover the chocolate border would prove but a weak and pale style for this part of the panel. If the leather were in its own buff with dull blue or green figures touched with maroon or gold, the concord would be better with the "dull bluish green" above. The horizontal beam over the window which forms the lower member of the cornice is embellished with an inlay of round decorated tiles. This we think an error; the treatment should rather be in squares than in discs for the sake of greater dignity and repose, and we cannot avoid the conclusion that in most cases tiles are an incongruity in woodwork, and the present is not one of the exceptional cases. We consider this design, as a whole, one of great promise.

"*Disco's*" contribution is an improvement on that bearing the same signature in the second competition; it is vigorously conceived and rendered, large and bold in character, and a unity of thought prevails throughout. The design of the wall is not incompatible with a conceivable ceiling. The author has managed so to render his composition as to give an excellent impression of values in black and white and these values are well studied. In his sideboard, which forms part of the design between the windows, the same characteristics of boldness and energy are evinced, though, like the rest of the design, it is lacking in consideration of detail. But one who can attack his masses with such decision and clearness of conception, is all the better prepared to understand the true function and value of subordinate parts, and to study them with the greater advantage. The stained glass bow-window over the sideboard is well arranged in connection with the sideboard, which, as it is therefore obviously intended to be a permanent part of the decoration, should have a closer alliance with the dado. The detail of the wall screen has very good lines. This gentleman, if he is true to himself, will produce excellent work.

The contribution, bearing the device of *an arrow and palm branch* crossed upon a shield, has received an honorable mention. There is a broad pictorial frieze over the windows, a panelled dado, and a wall-screen divided into a trellis of twelve-inch squares filled with natural foliage. The main divisions are harmonious. But the principal point of interest in this design is the scheme of color which is carefully set forth by description. The dado is in sea-green divided by maroon and gold lines; the field is composed of "light-colored leaves and cherries on gray ground with gold lines," the frieze has cold blue and gray figures and some gilded features upon a background of crimson and orange; the cornice, which is weak in lines and entirely destitute of architectural character, is in blues, light and dark, with gold. Notwithstanding the liberal use of gold dividing lines the frieze with its blaze of crimson and orange cannot consort with a blue cornice, a cold pale wall-screen and a green dado. The evident intention is to offset the warmth of the frieze by cold colors elsewhere. This is a laudable intention, but, if carried out according to the scheme, the incident and strength of the frieze would overpower everything else. The principal error is in the tone of the wall screen, which, excepting the green dado, should be made up of a harmony of neutral greens and olives enforced with black and perhaps spots of red to foreshadow the bright color above. These should be rather black than maroon in the dado, and blues should be very cautiously handled in the cornice, as, in connection even with neutral greens, they are difficult and dangerous except in the hand of a master. As for the frieze its *motif* is better suited, we think, to a public hall than to a private apartment, where, in decoration, subjects of idyllic interest would be more appropriate; moreover cold blue figures against a glare of sunset, do not impress the

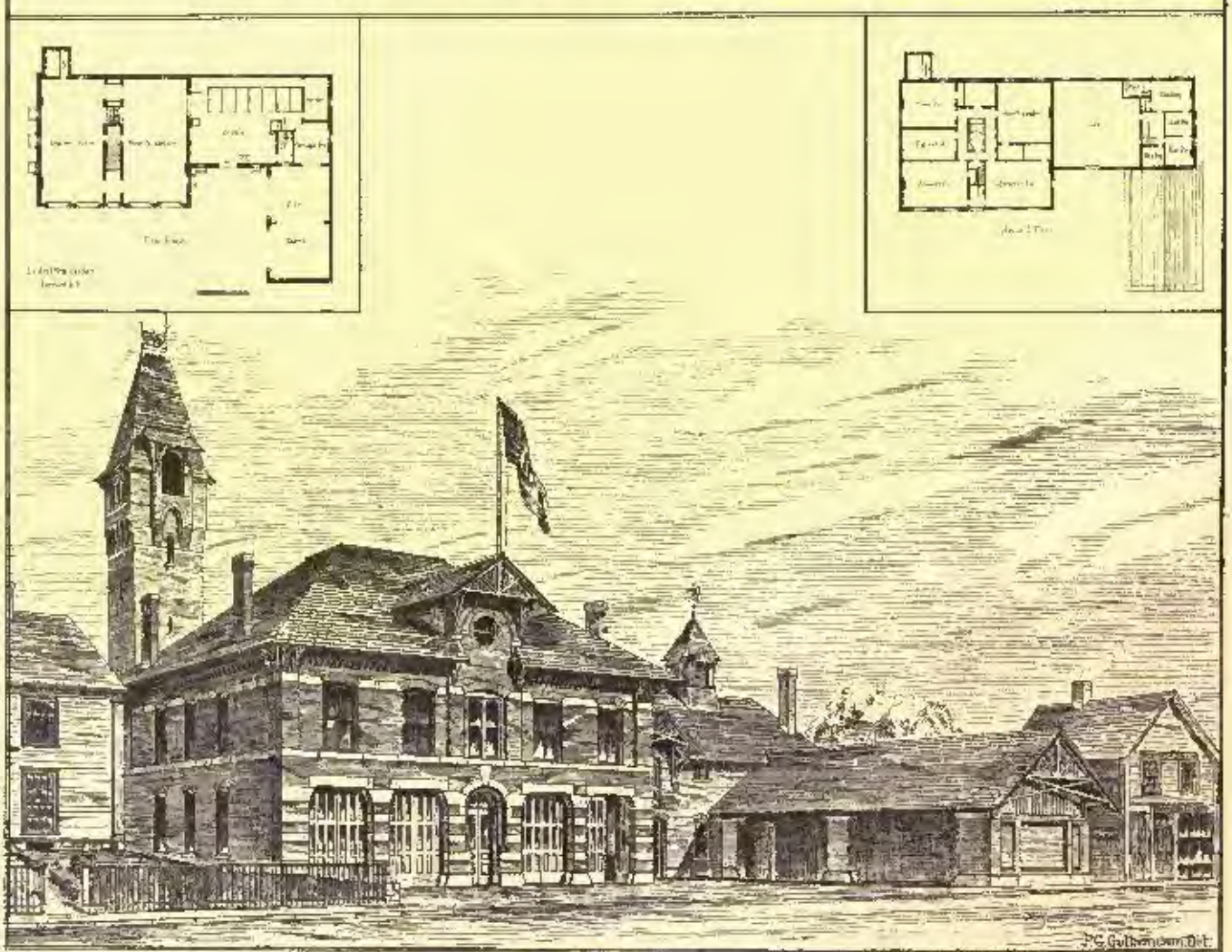






DESIGNS FOR A WALL DECORATION
COMPETITION No 3.

CHAS EDWD PARKER ARCHT. DESIGN FOR CHAPEL NEAR BOSTON.



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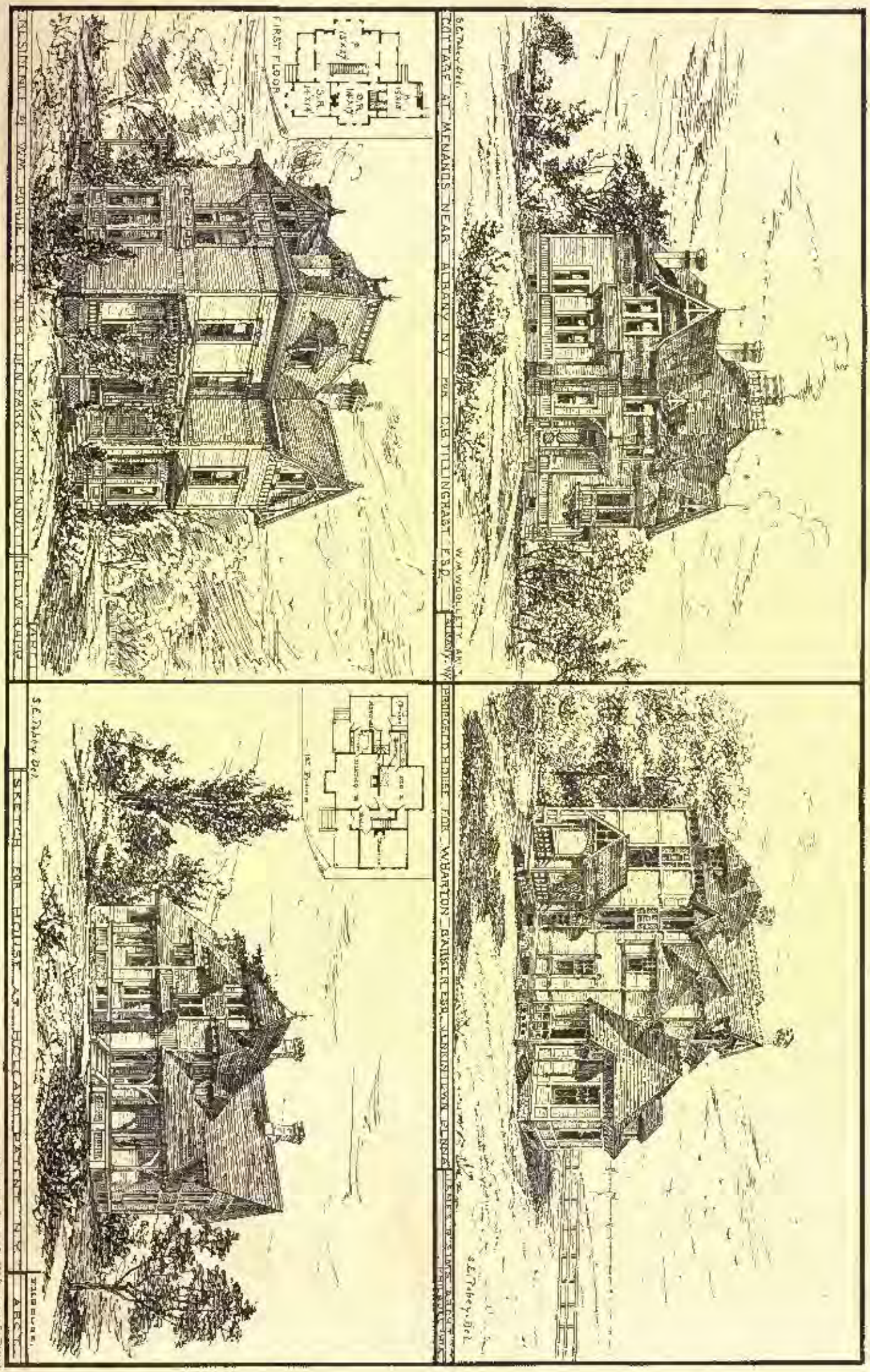
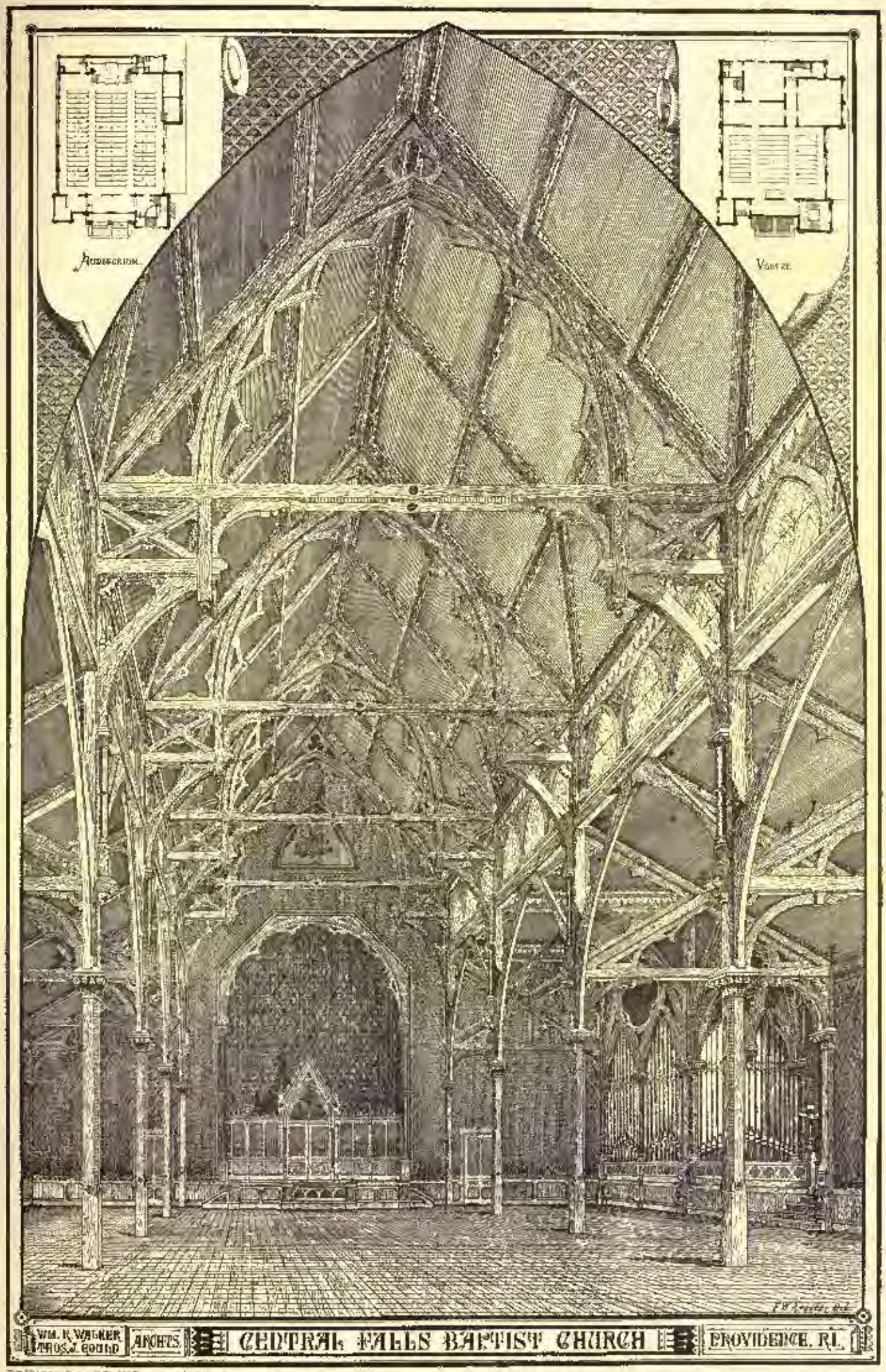
CENTRAL FIRE STATION, CONCORD, N.H.

CHAS EDWD PARKER ARCHT.


FIRST FLOOR
COTTAGE AT MENANDS NEAR ALBANY N.Y. FOR C.B. TILLINGHAST ESQ.
W.M. WOOLLETT ARCT.
ALBANY N.Y.
PROPOSED HOUSE FOR WHARTON BARBER ESQ. JENKINTOWN PENNA.
S.E. Tobey Del.
SKETCH FOR HOUSE AT HOLLAND PATENT N.Y.
S.E. Tobey Del.
ARCT.



THE HELIOTYPE PRINTING CO. 239 DEVONSHIRE ST. BOSTON

mind with an agreeable idea of color. This essay is very enterprizing, but a little practical experience with color would admonish the author to treat this useful servant with greater respect and forbearance.

The design bearing the symbol of a *clover-leaf* has some excellent points; it is carefully and neatly drawn, the parts are well distributed, and the *motif* modest. The cornice and its connection with the ceiling is very good. "Vellum, alternately, with a green leaf, and daisies in white and gold" is the color-treatment of the wall-screen which occupies an unusually large proportion of the decorative space; these colors are disposed in a square diaper with clover leaves. The movement and color is a little too light and bright or "dressy" for a dining-room. The embellishments of the dado and cornice and the figures in the fabric of the curtains are imitated from the modern English Gothic work, and are well drawn. The whole thing is quiet, sober, and sensible as compared with some of the other drawings, and invites furnishing with paintings; but it is not especially original,—a thing by no means to be condemned in a study made under these circumstances. The desire to be original should follow and not precede or even accompany the acquisition of the elements of knowledge.

"*Kenilworth*" gives us dado, screen, and frieze in good proportion. The last is enriched with a coarse reticulation or lattice of mouldings with a recurrence of panels in the centre somewhat more than twelve inches square, having alternately the useful peacock and the china plate; all this upon a background of dark "olive gray." The frieze sadly needs a cornice, and the subdivision of the frieze is rather coarse and heavy unless the mouldings are brought down nearer to the tone of the "olive gray," than the drawing would seem to indicate. Lines or bands of warm color on the background accompanying these mouldings would "marry" them with the rest of the design of the frieze and improve it very much. The screen below is a yet larger reticulation of mouldings with a decorative subject-painting in the centre on a gold ground. The background behind these mouldings on the screen receives a vertical treatment of "reddish brown" lines with apple blossoms between upon another "olive gray" ground. But the last "olive gray" is indicated somewhat lighter than that used in the frieze, and irregularly scattered over it, in Japanese fashion, are disks a foot in diameter bordered with black, each containing a bird. The dado is panelled in wood, and the windows have little galleries over them with pottery. The composition is wanting in delicacy, not of design alone, but of drawing. It is in effect spotty and noisy, and there is a poverty of invention revealed in the repetition of the mouldings crossing upon the surface; but as a whole, it is bold and vigorous, and the free-hand rendering is commendable. If dark olive is necessary in the frieze, the screen should be in some tones of buff to give the olive green greater value; the incident upon this buff, if in cherry red and olive tones, would have significance in clearing the buff and preparing for the frieze. Mouldings and woodwork of black walnut would consort with this scheme of color, and in all cases they should either have been wider or echoed with bands of color. The author should cultivate a more careful touch, but he has good ideas.

"*Chosha*" boldly incloses his two windows under a great segmental arch of stone, and at once gets into trouble in not knowing where and how to stop this material, so incongruous with interior domestic wall surfaces, and where and how to begin his decorative wall-treatment. The tympanum over the windows and under the arch is occupied with a color decoration of reeds, water, and birds, and the space between the windows is filled with a piece of furniture; there is also a heavy panelled dado with armorial bearings. Between the windows there is no wall treatment, as intended by the programme; but the segmental arch, with its impost line of stone, necessitates an overbearing frieze outside which is diapered without study. The little screen surface below has no very distinctive treatment. The work is done with a fine pen and much free-hand work, narrowly escaping the charge of "scratchiness." But there is not a little delicacy in the drawing. As a design for wall-treatment, it is far too original to be really good or beneficial to its author as a study.

"*Just So*," on the other hand, gives us a real study of superficial wall-decoration, and one not destitute of originality. There is no architectural character in the design. It includes a wall-screen of maroon, bearing a well-distributed Moresque vegetable pattern in green, yellow, and orange, with black outlines, firm and close in design. The impost line of the round-headed opening is continued as a narrow band of some dark tone separating the screen from a frieze of buff which is decorated with a slender lattice-work upon which delicate flower-bearing vines are trained following the lines of the arches; in each spandrel a fruit branch stands upright. The cornice is a mere band with a woven figure, and its mouldings and its connection with the ceiling are not recognized. There are birds of life size in the lattice work, giving an animated, playful character to the design. The dado has a moulded chair-rail and base (profiles not given) with an intermediate die, very prettily composed with an echo of the lattice-forms above with reeds and vines; the color is not specified. Here are excellent *motifs*, but adapted rather to a boudoir than to a dining-room. The dado has too much movement to be placed under a wall-screen of the character described and it should be deeper in tone than indicated to carry the heavy mass of maroon above. Dead green and black geometrical lines would do the work far better, and the dividing line between screen and frieze should be heavier and defined with black. With such a wall-decoration the cornice should be shown extending far out into the ceiling, and its color treatment should be defined to excuse and explain the wall. The composition has excellent elements in it.

"*Triangle & Co.*" sent in their contribution too late to be received in the competition, but it is daintily composed as a study in black and white though no "values" are indicated. The three component parts are apparently of equal depth of tone, and the panelled dado is too nearly equal in width to the frieze with its architrave and cornice. As a study of decorative lines, however, this design is of conspicuous excellence, and the movement of them is well contrasted in the three divisions. Thus the dado-panels have vases holding a conventional vegetable growth in radiating vigorous lines, filling the squares very gracefully; the screen is occupied by leafage also in scroll patterns, but quite free and delicate in its movement; and the frieze has conventional sun-flowers supported by scrolls and vines and prettily interspersed with flying birds. All this, so far as it goes, is very nice, and the ceiling is recognized in the drawing. A badly printed inscription sets forth the scheme of color, which is better considered than the majority of the work in this collection. The woodwork is oak, with plum-colored leather in the dado-panels; the screen is in sea greens; and in the frieze there is a dull blue with figures in buff, chocolate, and greens, and birds in bright colors,—a gay assemblage, but contrasting well with the rest. The oak, however, needs to be separated from the color by beadings of black; otherwise the different features would not be properly blended. The pictures hung upon the walls are badly drawn, and there are other indications of want of practice in the accessories; but the *intention* of the design is excellent. It is free from caprice.

"*Plymouth Rock*" frames in the divisions of his wall with similar architrave mouldings marked by blocks at the intersections, thus handsomely enforcing the fundamental parts, and giving firmness and repose to the whole,—a very good point. The filling in of the panels thus formed naturally becomes subordinate to their styles. The wall-screen is square, with formal figures equally strewn upon a light ground, and cleverly marked with black arabesques at the bottom. The dado is of woodwork unduly designed, and the frieze is again divided into square panels with game subjects in each, rather too small in scale to be effective. The lower member of the cornice is a wide fascia well decorated with conventional radiating leafage in half circles corresponding with the divisions below, and the cornice spreads well into the ceiling. The whole is delicately drawn and practicable; but as the author has failed to commit himself to a scheme of color, and as his drawing does not clearly indicate any relative degrees of light and dark, it is without the principal decorative element. The wall-screen needs pictures to complete it, as it is obviously intended only as a background, but the essay he has made in this kind of furnishing is injurious to the design. This is, on the whole however, an excellent contribution to the portfolio, and the committee may well have been embarrassed in the presence of such work as this and two or three others, not selected for honors, how to exercise a just discrimination.

"*Moonlight Eclipse.*" This is a study divided somewhat like the preceding, so as to have a square panel in the screen-space; but the frieze is continuous. The square panel is bordered with a carved egg and tongue ornament with coarse linear scroll-work in the corners, and a figure of Autumn in the centre of the field. The frieze has a heavy continuous scroll of conventional leafage in the German Renaissance fashion. These are the main points of the design, the whole effect being crude and better suited to a space of half the size. The drawing is done with pains, but the author needs practise with his pen. Such large wall surfaces need more detail than is here bestowed.

THE ILLUSTRATIONS.

THE INTERIOR OF CENTRAL FALLS BAPTIST CHURCH, LINCOLN, R. I. MESSRS. WALKER AND GOULD, ARCHITECTS, PROVIDENCE.

THIS church was commenced in the fall of 1875 and dedicated in September, 1877. The site, which is upon a side hill, admits of an entrance to the audience room but a few steps above the street in front, and at the rear an entrance on the level of the vestry floor from a side street. The interior is finished with Western ash and Southern yellow pine. The posts, rafters, tie-beams, and plates which show inside are oiled and shellacked with the chamfers painted a dull red. The pews of the audience room and gallery over the entrance are of ash, and will seat seven hundred persons. The transept on the south side contains the organ and choir gallery. The chancel screen is of ash with the upper panels of white pine engraved and decorated in color. The doors of the screen are directly over the baptistery, the steps into which are at each side behind the stationary parts of the screen. The windows are of cathedral glass, the large one in front being a memorial to a gentleman and his wife who were liberal contributors to the church. The basement contains a lecture-room, infant class-room, and small lecture-room, connected by glass partitions which may be opened throwing the three rooms into one; also a kitchen, parlor, closets, and librarian's room. The cost was below $30,000.

FIRE-STATION AT CONCORD, N. H., MR. G. E. PARKER, ARCHITECT, BOSTON.

DESIGN FOR A COUNTRY CHAPEL, MR. C. E. PARKER, ARCHITECT, BOSTON.

DESIGNS FOR A WALL-DECORATION. — COMPETITION NO. III.

SKETCH FOR A HOUSE AT HOLLAND PATENT, N. Y. F. H. COUCH, ARCHITECT, UTICA.

The lower portion of this house is to be clapboarded; the upper portion to be covered with pine shingles and oiled. The roof is to be shingled and painted a dark red.

RESIDENCE OF MR. POGUE, CINCINNATI, O. MR. G. W. RAPP, ARCHITECT, CINCINNATI.

This house was built two years ago at a cost of $6,000.

PROPOSED HOUSE FOR WHARTON BARKER, ESQ., JENKINTOWN, PENN. MR. J. P. SIMS, ARCHITECT, PHILADELPHIA.

COTTAGE NEAR ALBANY, N. Y. MR. W. M. WOLLETT, ARCHITECT, ALBANY.

THE FRENCH EXHIBITION.

I.

The Universal Exhibition of 1878, so long expected, is at length a reality. Doubts have been openly expressed regarding this happy consummation, and many more have been entertained in secret. Rumors of wars abroad and of troubles at home have threatened the success of a costly undertaking, for international exhibitions require peace above all things. As it is, the German empire is not represented, and an important element of the universality which the Exhibition boasts is wanting. Only at the last moment, after all available space has been taken up, the German emperor has so far relented as to allow the contribution of paintings, always provided that there are none among them which commemorate events of the war of 1870, — a concession which has been warmly received by the French commissioners. Whether such gatherings and competitions really tend to the revival of trade, the promotion of peace, and that happy confidence between man and man, that softening of morals and manners, and that general improvement of the human race which seem to be expected in some quarters, is a question. It is a question well worth asking; but it would receive answers of a very contradictory kind. These great exhibitions have little in common with the international fairs, such as those of Leipsic, Frankfort, Beaucaire, and other cities, in which various nationalities used to be represented. Curious products in the shape of Russian furs, Polish agates, and many-colored fabrics were sold and exchanged by dealers, often in strange costumes. But these were fairs, not exhibitions; general markets for populations which lay out of the reach of seaports, and had no ready access to large capitals. Our modern exhibitions are a sort of race-meetings, in which the cotton-spinner of Lancashire backs his machines and their results against those of his rival at Rouen. They are matches, and the stakes do not necessarily fall to the best man unless he comes across a complete class of customers to whom his productions are new; and also unless these latter are such as cannot easily be imitated. Exhibitions of industrial products, as such, are a French invention. The minister of the interior, François de Neufchâteau, got up a display of this kind in 1798, to glorify the sixth anniversary of the republic. A circular shed was constructed in the Champ de Mars, and a dozen or so of medals and honorable mentions were distributed from the "Autel de la Patrie." It was proposed to keep the show open for three days; but it was so popular that it was allowed to remain for ten more. Another was held in 1801; others in 1802 and 1806. In 1819 it was decreed by royal proclamation that such exhibitions should be held every four years. The government of Louis Philippe decided that they should be at intervals of five years. They were opened on the 1st of May, the birthday of the king, and the series was continued down to 1849. These exhibitions at first included the manufactures of France only, then of France and her colonies. The first proposal for the exhibition held in London in 1851 applied only to native and colonial productions; it was enlarged by Prince Albert into a gathering from all quarters of the world; and it is from that famous display in Hyde Park that the vast universal exhibitions of London, Paris, and other capitals have grown to their recent proportions. As there is a national rivalry amongst exhibitors, so there has been a national rivalry in the scale, the splendor, and the surroundings of the exhibitions themselves. They are national fêtes and spectacles meant to leave their impression on the world, to give a lift to the nation and the capital in which each is held. Such a motive is comprehensible just now in the case of France; and moreover the strangers who flock to Paris will leave substantial proofs of their good will to the owners of shops, hotels, and restaurants.

If the size and pomp of these assemblages have gone on increasing ever since the first — the most modest, sensible, and successful of the whole series — in 1851, this of 1878 will surpass them all. It is held in two vast buildings, one on either side of the Seine, and united by the Pont de Jena. But, large as they are, these structures are by no means sufficient for the raw productions and manufactures they are intended to hold, which overflow into "annexes" and sheds spreading far over the Quai d'Orsay and the Esplanade of the Invalides. The main building is placed in the Champ de Mars, a space some thousand yards long by seven hundred or so in breadth, running from the great military college to the river. This spot was the scene of the great fête of the "Federation," when the able-bodied population of Paris, of both sexes and all ranks, headed by the king, worked without ceasing for seven days, singing "Ça ira," and raised banks on each side from which the public could see Talleyrand, bishop of Autun, celebrating mass at the "Autel de la Patrie." Other less ostentatious ceremonies and reviews innumerable have been held on this well-known ground. Here stood the "Palais" of the Exhibition of 1867, a huge, oval structure like a vast gasometer, with a garden in the middle. Each nation had a slice assigned to it, wedge-shaped, from the outside to the garden; and a portion of the surrounding grounds, which were laid out as shrubberies, contained sheds, pavilions, kiosks, stables for the horses and dogs of the emperor of Russia, and other dependencies. The present Palais is a parallelogram, and, with its adjuncts, occupies the whole width, and between six and seven hundred yards of the length, of the Champ de Mars. It has three towers facing the Seine, and two at the corners of the other end. A great hall or transept runs along the river end. Half of this large vestibule is assigned to England; and this part contains a domed wooden structure filled with Indian productions of all sorts, and a cast of the Indian statue of the Prince of Wales, by Herr Boehm. In the French half, a room or gallery has been made at the last moment to hold the pictures contributed from Germany. Of the general space, one half belongs to the French, and of the other half about one quarter to England. Other countries have slices wider or narrower; those allotted to Austria, Belgium, Italy, and Russia being the most considerable. Each slice runs from the Avenue de Suffren, the western boundary of the ground, to the centre; and each nation has a piece of the garden that intervenes between the outside of the building and the boundary. England, Norway, and some other nations have here put up sheds and annexes, where they can show various objects for which there is no room indoors. Our own people have a large and valuable collection of agricultural implements and machinery, a boiler-house, another for barrels, and so on. On the French side there is no spare ground. The things exhibited are arranged in the same order in each national space, — the finer and more artistic in the centre of the building, then commoner manufactures, machinery, food products, etc., one behind the other. It was intended that the middle of the entire space should be a garden, as in 1867, but it has been filled up by picture-galleries, separated from each other, but forming in fact a continuous mass. There still remained an oblong space, which lay between two wide transverse alleys which run from side to side of the entire structure; and this space may measure about a quarter of the entire length. This has since been taken up by a showy "Pavillon de la Ville de Paris" for a municipal exhibition of its own, and the open space is reduced to two roads or esplanades running from end to end of the building.

This is the more to be regretted because the foreign side contains what is perhaps the most interesting feature of the whole interior — a street consisting of house-fronts in the style of architecture characteristic of each nation. This is really a new feature, and it is admirably carried out. The English portion of the street is made up of a wood and plaster Elizabethan house, designed by Mr. G. Redgrave, and erected by Messrs. Cubitt, at a cost of £3,000. It is admirably put together in pitch-pine (varnished unfortunately). All the framing, doors, windows, etc., down to the leading of the glass, are from their own building works in London. Another is a front of imitation brick and stone in the style of Burghley Hall. This is the Pavilion of the Prince of Wales, and is fitted up inside by Gillow and other large London houses. It contains a dining-room panelled in inlaid walnut, with tapestries above; a business-room, and dressing-rooms for himself and the princess. The fittings and furniture are, of course, "exhibits," and include table services for a score of guests, in case of luncheons or breakfasts in the place. Another front is in the Queen Anne brickwork, now coming into fashion in London. It is designed by Mr. Norman Shaw, and exhibits some new inventions of imitation brickwork, which are exhibited by Messrs. Lascelles. These imitations take the form of long cornices, fluted pilasters, and so forth, such as make up the façades of old London red brick architecture. When fractured, they are found to be of full Indian red color throughout. They are screwed in large pieces to a frame-work of wood, and the exhibitors offer to the building public a new material which they declare to be *more* durable than brick. What the Board of Works, and the Fire Brigade, and architects in general, may find to say to so daring an invention we cannot conjecture. It will be like buying an enlarged set of children's wooden bricks; for we may procure bales of this material and lay them out on the lawn in endless combinations, and the carpenter will screw up the pieces and redistribute them to the taste of the proprietor. We live in times of progress. Another English front is a wood and plaster house, the latter material moulded after the pattern of much town and village architecture of the south of England in the sixteenth and seventeenth centuries. This house contains pretty rooms and staircases, and is built and furnished by Messrs. Collinson and Locke. Another is a fourteenth-century civic front, half French, half Italian, with four large pointed windows, enriched with florid foliage. The whole is offered to public criticism by Messrs. Doulton, of Lambeth; and is made up of glazed and painted and of unglazed stone-ware and terra cotta, down to the voussoirs of the arches and the angles of the building; the

small portions of wall are red brick, a bold experiment in modern house-building.

Walking onwards, one passes the American front, with curious imitations of plaster-work stamped out of zinc. Sweden and Norway are represented by wooden fronts ingeniously cut and pierced out of pine timber; good examples of the national architecture. The Russian section, some few "doors" down, is also of timber; in fact, a complete log-house in structure, with quaint gables and fretted and pierced wood ornaments. These are both thoroughly national. The Japanese and Chinese, who both have considerable sections, are also fronted "to the street" with curious national architecture, something of the kind so long familiar to us in the "willow pattern." The nation from which we should have expected the most effective of these fronts, — the Italian, — and which might have chosen from a dozen of styles and varieties, leading to the full-blown Renaissance, all thoroughly national, is perhaps the least interesting in this respect; the front savors somewhat of the ballet scene. The Belgians have a costly and effective example of their modern Renaissance building in brick and stone, and the Dutch also. The Persians, Siamese, Tunisians, and Morocco merchants are fronted by a small but elegant balconied piece of stone-work, and the Duchy of Luxemburg by a transition façade in stone. Close to the fronts of Morocco and Tunis is one contributed by the tiny republic of San Marino, which, considering its size, makes a wonderful show. Portugal, which intervenes between the Duchy and Holland, has a reproduction of a range of cloister arches, moulded in plaster, from an old building near Lisbon. It is in the style of the late Burgundian Gothic of the fifteenth century, bold in outline and proportion, and rich and quaint in the complications of tracery in the arch and on the columns and supports. This front is returned from the "street" end and carried along the flank of the section, and is singularly effective. It will remind collectors and antiquaries of the large and generally successful ornamentation of the country and time, which had its influence not on architecture only, but on plate and goldsmith's work all over that portion of the Peninsula, then the cradle of discovery and the home of commerce.

The Exhibition is too incomplete to allow of any remarks upon its component materials; but the building itself, with this very interesting feature of it, is finished for the opening. The inauguration is a month later than it was in 1867; but a vast amount of goods have lingered on the road. One cause of this delay is the weather, which this year has been unusually rough through March and April. Piles of bales and cases from England and all parts of the world long encumbered the quays of the northern ports. The latest arrivals were heaped on those sent weeks before. Whether the plant on the French railways is unequal to the dispatch of such accumulations, or whether the staff is unable to set it in harmonious motion, this unpunctuality is laid at the doors of the railway companies, and wholly repudiated by the commissioners and representatives of foreign nations. As for the gardens, the shrubs are brought into them in full leaf, — that much is soon done; but grass seed has not been laid a fortnight upon the lawns, and the entire show will hardly be complete before July.

One notable feature of the Exhibition of 1867 will be missed in that of 1878. All round the huge oval of the former ran a vast veranda opening into some hundred restaurants and cafés, probably even a larger number. The hungry and thirsty had no distance to travel, and the foreigner whose time was precious could breakfast, lunch, and dine on the spot, directing his inquiries in the way least fatiguing and most convenient to himself. There were English, French, Austrian, Italian, Bavarian, Russian, and Chinese establishments, where travellers were served by native waitresses, the most comely that could be chosen, and where they could eat all sorts of national dishes, from roast beef to bird's-nest soup. The Paris restaurants have rebelled against a repetition of this agreeable and convenient arrangement. It robbed them of their expected harvest. Eager as the great nation is for the improvement of arts and manufactures, the obvious opportunity of levying toll from crowds of sightseers, who mostly come to enjoy the show, is not to be put into the background. There is to be nothing of the old system this year. Four modest buffets at the four corners of the Palais, one or two restaurants in the park or garden outside, are all that is to be allowed on the south side of the Seine. One would hardly suppose that the attendants and stall-keepers could be served in such limited quarters, and where will the inexperienced stranger and his hungry sons and daughters be? The place is at some distance — two miles or so — from the busy parts of Paris, and the arrangement will no doubt keep visitors away, or curtail their stay and the number of their visits. There is no decent establishment within reach where anything but sausages and liquor can be obtained.

It is satisfactory to be able to add that of all the nations represented our own is the most forward. Our national spirit of independence is shown in the wilderness of cases, mostly black, but of diverse ornamentation, in which our wares are exhibited; but perhaps there may be more air to breathe and a few more ca-es placed in the English than in the French and other sections. The French collect their classes of exhibitors — the Lyons silk merchants, for instance — in cheerful courts, where their stalls and stuffs are shown to advantage. Each manufacturer contributes to the "get up," and has his own section of the glass cases, subject to the arrangements of a sort of temporary syndicate of his compeers. The judges are, or ought to be, fully competent to select and reward the best exhibitors without reference to the accidents of arrangement and the like, but the general public, it must be remembered, are pleased or repelled by the attractions of the place quite as much as by the excellence of the wares, — a fact well understood in the costly dispositions of modern London shops. The firm of Campbell and Minton, more adventurous than most of their rivals, have constructed, at a cost of a thousand pounds or more, a complete court of their own in celadon green, filled with porcelain and majolica. Of this we may speak more particularly at a later period.

The imposing addition to the Palais on the height called the Trocadéro, its galleries, porticoes, theatre, gardens, fountains, statues, pavilions, kiosks, and other attractions, must be postponed for the present, — above all its contents, a loan collection of precious objects and works of art, for none of it is complete. Our own commissioners take no part at all in this very interesting side of the Exhibition. It will be mainly contributed by French collectors. They are no doubt rich enough in those objects to fill the galleries twice over; but it is not to be denied that we should have been pleased to see once more some of the treasures, so rarely accessible, of our wealthy collectors in England. — *The Saturday Review.*

CORRESPONDENCE.

THE ART CLUB EXHIBITION. — THE OPPORTUNITY FOR MAKING A NEW PUBLIC PLACE. — DRAWING IN THE FREE EVENING SCHOOLS. — THE SOCIETY OF ARCHITECTS.

Boston, May, 1878.

THE second exhibition of pictures at the Art Club rooms is over, and it is pleasant to find that the artists are not paralyzed by the pressure of the time. Some interesting work was shown, concerning which it would be agreeable to particularize. I shall, however, content myself with a single reflection, — namely, the variety of good paintings of architectural subjects. In the drawings of architects, however spirited and artistic, there is always and rightly the professional stamp, visible and prominent. It is therefore profitable as well as agreeable to see a fine architectural subject treated by a painter without professional prepossessions or methods. In this view I was much interested in the large picture, by Mr. Duveneck, of the interior of St. Mark's. This church has always been a favorite subject with painters, to whom its picturesqueness of outline and its richness and variety of color must always make perhaps a stronger appeal than even to architects. But it has, I think, rarely been treated in so satisfactory a manner as in this picture. There is no exaggeration or idealization. The sombre richness of the marbles and mosaics and the softened glow of the gilded capitals are rendered with unusual truth as to outline and local color, and the picture has thus the merit, not often found in works of this kind, and which I dare say the artist never proposed to himself, of teaching authentically certain facts as to the architecture of one of the important churches of the world. I have seen a copy of the report of the committee appointed to visit the academic department of Harvard College, for the past season, in which the sub-committee on the department of fine arts, in speaking of the courses of lectures given by Professor Norton, regret "the almost total lack of means of illustration," observing with truth that "the essential qualities of a work of art cannot be got from description." They might have added, while recommending the purchase of photographs and casts, that much of the architecture which has occupied so large a proportion of Mr. Norton's courses depends very largely on its color for its distinctive character. A half dozen pictures like Mr. Duveneck's St. Mark's would be of immense value as illustrations of lectures like these. But as the acquiring of such pictures would involve an outlay beyond what we may reasonably expect of the college, I venture to suggest that an architectural room in the Art Museum, where such as might be from time to time acquired might be brought and kept together, would prove to be not the least interesting and valuable among the various galleries of this growing institution.

It is good to see the work commenced on the completion of the north side of the museum. When this is finished we shall have a façade looking less like an humble beginning, and in some degree commensurate with the rank which the museum has so promptly taken among the established institutions of the city. It will then be time — indeed it is time already — for the city to determine whether the museum is to front on a narrow street or on a public place, and whether the opportunity for making, at a trifling cost, a square which shall be the finest architectural point in the city shall be thrown away or neglected, as so many opportunities have been before now. So many important public and private buildings are by a singular chance gathered around this little triangle, so many broad and long avenues diverge from it, and it is so in the centre of the newest quarter of the city, and that quarter on which by far the greater portion of the future building must take place, that one may safely say that in no other city than Boston would there be any hesitation about laying it out as a public place, with a little green turf and perhaps a fountain or a statue. But a city which turns its back on an estuary like Charles River, which cuts down the Paddock elms in a fit of noble rage because they "ain't growin' any better," which out of a dozen miles of water-front on river and harbor reserves not so much as a foot for a public pleasure-ground, and which sees with

complacency the lovely hills which surround it hidden one by one under rows of close-set dwellings, cannot be expected to give much thought or spend much money in providing for picturesque effect in city streets. We think ourselves fortunate in living in almost the only large town in America which has escaped the plan of the checker-board. To this and to our irregular and hilly surface do we owe such picturesqueness as hitherto belongs to us. A very little invention, with a very little liberality in money appropriation, would bear fruit a hundred fold in adding point and interest to our walks about the city streets.

The exhibition of pictures at the Art Club has been followed by the annual show of drawings from the various free evening schools maintained by the city. The drawings of this year are rather disappointing. Only one of the schools seems to me to have made an exhibit in any way creditable. This is the Tennyson Street School, which sent some really good work from the object, including casts of heads and foliage, in which the outline was firm and true, the touch at once vigorous and delicate, and the gradation of light and shade well balanced and intelligent. There were also here some very good designs for tile, in which the pattern was graceful and the colors were well managed and harmonious; and one or two sets of architectural drawings, as to which little can be said for the design, but of which the plans were judicious and the execution respectable. I was surprised to find this the only school in which any drawings were made from the object, and the only one from which any original designs were shown, with the exception of a few designs for tile in the East Boston collection. All the other drawings from the schools in East Boston, Roxbury, Dorchester, and Jamaica Plain were from flat copies, and it would seem that the subjects were selected by the students themselves. At any rate, they were in many cases quite beyond the capacity of the student, and in the case of the architectural drawings, which were numerous, the designs were generally beneath criticism, and the drawing as bad as the designs. Now it is difficult to compare any drawing or collection of drawings with one seen a year ago or more; but I doubt if any previous exhibition has been made by these schools in which the result of the year's work was so bad. The schools have indeed ceased to be a novelty. Persons specially interested in matters of art, as well as the public generally, have ceased to take that lively interest in them which was natural as long as they were a new experiment, and the inevitable tendency is towards a slackening of effort on the part of the teachers and of supervision on the part of the committee. But if schools of drawing are to be maintained by the city at all, they should be held to turn out better work than the most of that which was shown at the Art Club this year. That they can do so has been made sufficiently clear by the exhibits of previous years.

The monthly meetings of the Society of Architects have been brought to a close for the season. A visible decrease must be admitted in the interest and usefulness of these meetings as compared with those of former seasons. This can scarcely be accounted for by the absorption of the members in the cares of an engrossing profession; perhaps more reasonably by the opposite theory, since it is no less true than exasperating that a time of leisure from enforced occupation is the least likely to be fruitful in those results which it would seem most natural to expect from it. It is when men are most driven by the pressure of imperative business that they are most apt to find time to use their minds to advantage in collateral pursuits. Be this as it may, it must be confessed that few seasons since the formation of the society have seen so little activity in those lines in which its enterprise has been used to manifest itself. Let us hope that the highly respected committee on providing business and entertainment, which has laid out in past seasons so much good work, will remember that the committee holds over the recess, and will during the summer months lay their heads together and devise a scheme which will start the society in October on a series of meetings more stimulating and useful than the best we can remember.

NOTES AND CLIPPINGS.

Tests of Metals at the Navy Yards. — The Secretary of the United States Navy, having made a careful test of some specimens of iron manufactured in the navy yard at Washington, is investigating the question of the cost of fitting up the necessary smelting apparatus there for the purpose of making iron back from scraps and ore. There is a vast accumulation of scrap iron yearly at all the navy yards, which is said to be sold usually at about one tenth its value, and which might be readily utilized if the necessary furnaces were built. The Secretary has also ordered tests to be made of a new composition which the inventor claims will neither corrode nor change its color, and which is almost the hue of gold. It is claimed that it can be substituted for sheathing-copper with great advantage, as it is many degrees lighter than copper; that it can be utilized for a vast number of purposes on shipboard where other metals cannot be so well used, as the composition will also retain its brightness.

Fall of a Floor. — On May 24, while men were at work tearing down a building on Mercer Street in New York, a portion of the second floor gave way and carried with it to the cellar about a dozen of the workmen, one of whom was instantly killed and four others were hurt. When the ephemeral nature of our buildings is remembered, it is strange that more accidents do not happen when it is necessary to pull them down, for it is not possible in this country to find such men as the long course of improvements in Paris under Baron Haussmann has made adepts in the safe and rapid demolition of buildings.

Advertising Government Contracts. — Mr. B. F. Butler is trying to bring into being a publication which shall be called the *Official Advertiser of the United States*, and he has succeeded in getting his bill through the House and may succeed in getting it through the Senate. In this publication are to be printed all the calls for proposals for government work of all kinds that are now printed in many of the daily and weekly papers throughout the country, where it is fair to suppose they meet the eyes of more people than would see them if they were to be found only in a special publication. To professional contractors and to that class of contractors who make a specialty of bidding for government work, such a collation would be undoubtedly of the utmost service; but we question whether the present system of paying a moderate price for the advertising of "proposals" as now done is not more for the real advantage of the Government.

Grace Church Reredos and Altar. — Robert Ellin & Co., of New York, have received an order for the erection of a reredos and altar for Grace Church in that city. The principal material to be used is white statuary marble. On either side of a central gables will be buttresses with canopies containing figures of angels. The gablet has a bas-relief of a dove with outstretched wings, and is surmounted by a jewelled cross. There will be five bays, each containing a mosaic. The central panel will contain a representation of the Last Supper, and on the front of the buttresses will be shafts of red Champlain marble. The panels on the lower section of the reredos are to be inlaid with various colored marbles. The right buttress will contain the credence and piscina. The front of the marble altar table will be separated into three foliated and pierced panels by the shafts of red Champlain marble, and will be three feet two inches high. Red and green Sienna marble and white statuary marble will compose the centre panel. The bases of the shafts will be of carved white marble, the whole resting on three gray marble steps.

A Monument to Cervantes. — Not long ago a celebration was held in memory of the well-known Spanish writer Cervantes, the proceeds of which were to form the nucleus of a fund with which should be built eventually in Central Park, New York, a suitable monument to his memory. The design of Señor Fernando Miranda has been accepted by the committee having the matter in charge, and it is hoped the corner-stone can be laid in September. It is somewhat difficult to picture to one's self what is meant by the description of the monument which lies before us, but apparently a bronze statue of Cervantes, of heroic size, is supported by a pedestal whose die has inclined sides and the line of whose cornice is interrupted by a segmental pediment which emphasizes the writer's coat of arms beneath it. The plinth will bear bas-reliefs of the battle of Lepanto, where the author was wounded, and a scene depicting his captivity in Algiers. What will probably attract more attention than the statue of Cervantes himself is a life-size group in bronze of Don Quixote mounted on Rosinante, who is telling some tale to the wondering Sancho Panza on muleback at his side. This group is at the foot of the pedestal, on a platform from which steps lead to the ground below. [Another and seemingly more probable description says that this group of the old knight and his squire is to be a bas-relief.] Although the marble of which the monument is to be built is to come from the birthplace of Cervantes, from Granada and other places in Spain, the work upon it is all to be done in this country. It is intended to petition the Government for the gift of some of the old Spanish cannon at West Point, which were captured in Mexico, and some of which are thought to be of the time of Cervantes.

A School of Fine Arts for Women. — A school has been opened at Rome, under English patronage, to which women alone are to be admitted. It will be established near the convents of Saint Isadore on the Pincio, where during the winter months the students will be under the direction of Professor Cummaniro, of St. Luke's Academy. Ladies who wish to know further of the particulars of this scheme should address Miss Mayor, care of Messrs. MacBean & Co., 378 Corso, Rome.

An Architectural Copartnership. — Visitors to the Paris Exhibition will probably find no more interesting façade in the Rue des Nations than the little façade which at a cost of about four thousand dollars has been built by those miniature European states: the Grand-Duchy of Luxembourg, sixteen on the northern confines of France, the Principality of Monaco, at the base of the Maritime Alps; the Republic of San Marino on the eastern coast of Italy, and the little provost-governed district of Val d'Andorre perched upon the Pyrenees. M. Vaudoyer was charged with the designing of this façade, and he has made of it, if not a strictly homogeneous design, yet a very interesting frontispiece and a piece of work that is archæologically exact. The parts of the façade are apportioned according to the dignity of the contributing states. Luxembourg, as the most important, has the two bays at the left, which occupy about half the breadth of the façade and are in design a reduction of a portion of the palace built in the sixteenth century by the Spaniards, and which at this moment is the residence of the grand-duke. Monaco is represented by the doorway of the section, which is copied from the palace of the prince of Monaco and is in the style of the time of Francis the First. The bay over the portal in the second story is assigned to San Marino, and is more in the style of French than Italian Renaissance. To typify, perhaps, the natural inaccessibility of the Val d'Andorre, the portion of the façade that is assigned to this little independency is the balustrade above the portion belonging to San Marino, but perhaps it makes up for its inferior — if elevated — position by displaying two coats of arms, while its copartners content themselves with one. The central feature of the façade, which serves to accentuate it and to divide the portion of Luxembourg from the rest, is an octagonal bay supported on a pilaster. The position in the Rue des Nations assigned to these temporary allies is between the Moresque façade of the kingdom of Tunis and a façade in Gothic style.

An Exploration into Africa. — The *Moniteur Universel* of Paris is to send an exploring expedition to equatorial Africa, under the leadership of M. P. Soleillet, whose scheme for building a railroad across the Sahara we mentioned not long ago.

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SUPERVISING Architect Hill's letter to the Secretary of the Treasury concerning the complaints against his office in the administration of the Chicago Custom House has been published in full in some of the papers. He recalls the facts that the contracts under which stone for the building was furnished and cut by Mueller were contracts dating back some years before he came into office; that the fifteen per cent contract for cutting, which has made the chief trouble, was of a kind against which he had especially protested, and most of which he had succeeded in abrogating. This particular contract was not abrogated, because the greater part of the work it called for had been furnished, and because the alterations that he had been required to make in the design of the building made it necessary to recut a large amount of stone which the Government had already received and paid for: to adjust a new contract so as to cover the working over of this stone would have called for a great deal of difficult computing and valuation, involving a serious delay of the work; so that on the whole the lesser disadvantage seemed to be in going on as before. The cost of the work done in this way he thinks has been excessive, though not more so than under other similar contracts, except at the very last, when the men carefully nursed their work, with the feeling that "it would be no worse to be discharged for loafing than to work themselves out of a job." The cost could not be known at the Supervising Architect's office until it had been paid for by the disbursing agent (the Collector, Mr. Smith himself), whose duty it was to refuse payment if he suspected anything wrong. To guard as much as possible against overcharge practical stone-cutters were engaged as time-keepers, one to every hundred cutters employed, under orders to "remain at all times during working hours in the sheds, and see that each and every mechanic is constantly and efficiently employed; to remain on the work until the termination of working hours, and be able to satisfy themselves [and the superintendent] that each and every employee had remained until the close of working hours. The superintendent was further instructed to keep himself informed of the efficiency of the men employed, and insist on the discharge of any whom he found neglectful or idle, with the understanding that the Department would hold him responsible for the cost of the work.

As to the sawing of the stone, about which great complaint has been made, the letter recalls, what was overlooked by the Collector and Attorney-General in their accusations, that the contract which allowed thirty-five cents per foot superficial for sawing, to be substituted for cutting at the discretion of the superintendent, at the same time cut off the allowance of an extra half inch in dimension for quarry size from the faces sawn, whereby, as Mr. Hill computes, a saving equivalent to five and a half cents per foot was made, practically reducing the cost of sawing to twenty-nine and a half cents. The question was, he adds, not whether contracts could not now be made under which the stone could be more cheaply cut, but whether under the existing contracts, which had been sustained by the law officers of the Government, and by which he was therefore bound, the stone would be worked more economically to the Government by sawing or by cutting. Of this the superintendent was made the judge, being instructed to allow and pay for only such sawing as he considered economical, and this he claims to have done. Examination of the schedule-books shows, if we understand the letter rightly, that the cost of working was on the average less for the stones which had sawing upon them than for those that had none. The accusations of the District Attorney that the supplementary contract was unreasonable and therefore fradulent, whereby Mueller, who had contracted to deliver the uncut stone at the site, required additional payment for hauling it to the building when under his second contract he had cut it, the letter characterizes as either careless or disingenuous. It says that the demand for extra compensation was at first refused, on the ground that the contracts were essentially one, and that if Mueller was bound to haul and deliver the stone uncut he was bound to haul and deliver it when cut. This position, however, was overruled by the Attorney-General, who decided that the obligation of the first contract did not cover the second, and that Mueller's agreement was simply "to cut the stone which the United States may supply him for that purpose out of that which under the first contract he has delivered and they have received." The supplementary contract for hauling was therefore prepared under Mr. Potter's administration, and executed immediately after by Mr. Hill with the approval of the Secretary of the Treasury and the Solicitor of the Department.

THE flood of letters, despatches, and reports which this investigation has let loose in the papers, especially in those of Chicago, is voluminous and weary reading. The effort to sift it displays to the full the difficulties of what has been properly called trial by newspaper. The right apportionment of blame and responsibility among the many persons concerned with it is only to be got at, if at all, by the examination of details accessible perhaps to the proper officers, but beyond the reach of newspapers. Two or three points, however, declare themselves very distinctly. One is the enormous difficulty which is laid on the Supervising Architect's office by such a system of contracts, which requires that an army of men, working and shirking in their own and the contractors' interest, shall be watched by a corps of time-keepers, assistant-superintendents, and superintendents, each depending on those below him. With contractors and men conspiring to make easy work the utmost vigilance in the superintending corps could be only half efficient. An inefficient or unfaithful officer at any point in the series would spoil its working, and even the best result would be likely to be far from economical, though it might have the recommendation of securing workmanship of the first class. Another point is the easy adroitness with which the contractor in this case has managed to draw his profit from all the circumstances that favored him, notably the astute way in which he took advantage of the unlucky lapse in his second contract; apparently compelling the Government to choose whether it would let him deliver the stone which he was bound to bring uncut to the site, and then pay him for hauling it away, cutting it, and hauling it back again,—or leave him to dump it at a convenient spot and pay him for cutting and hauling once. The officers of the Government are at disadvantage enough under any system that calls on them to spend their chief energy in resisting the impositions of those who do its work. It is at least desirable to devise a system which shall do this work as simply and directly as possible.

WE are glad to infer from the communications touching the Qualifying of Architects which appear in this number of our journal and in our last but one, that the subject appeals to a general interest in the profession, as it certainly concerns its welfare as much as it does that of the public. Our correspondent of to-day asks, "While we are struggling to learn all we can, and build as safely and as well as we may, is the time quite ripe for drawing such sharp lines?" The trouble, however, is not with those of us who are struggling to learn all they can, but with those who, without waiting to learn any thing they can help, are struggling more or less successfully to get control of important work; and with the public which unsuspiciously employs them because at present there is nothing to show the difference between those who struggle to learn and those who do not. "The

public often insist upon employing quacks and charlatans," says our correspondent justly. There is a part of the public that naturally gravitates to the patronage of quacks in every avocation; for this part not much can be done. But the larger part would welcome any means of distinguishing between the competent and the incompetent. The first step toward such distinction is naturally to give them some idea of what knowledge architects ought to have; of who among architects neglect this knowledge, and who acquire or at least assume to acquire it. We cannot agree with our correspondent that there is as good opportunity to judge of charlatans in our profession as in another, — that is if "another" means any other; nor if this were correct would it determine the question. The older professions of law and medicine are at least hedged about in most of the United States with restrictions which fix a minimum of preparation for them. The minimum is necessarily very moderate, but it makes a clear distinction between those who have attained it and those who have not, and the tendency is to increase it; witness, for example, the new regulations of the New York bar; whereas in architecture there is absolutely no point of ignorance at which a man is marked off from the profession.

We do not know how serious a purpose underlies our correspondent's lively enumeration of the qualifications of an architect, but may take it for granted that he means to imply the impracticability of enforcing by individual scrutiny any standard of thorough competency. We do not fly at so high game as this; the profession and the country are both too new for it. For what discrimination the time — that is to say the community — is ripe it is not easy to say until we have tested it. A few years ago, when there was no architectural instruction to be had in the country, it would have been idle to propose any qualifications. Now that such instruction is provided, it will be reasonable to say that henceforth those who fail to take advantage of it shall be recognizable to the public; so that if it chooses to put its lives and property into their hands it may do so wittingly. If any considerable number of architects could be induced to submit to such an examination as Mr. Eidlitz proposed in our last number but one, it would no doubt tell strongly in raising the standard of the profession. But if not, it would be worth something to have any standard of acquirement publicly recognized, however modest, below which inadequate preparation should be stamped as inadequate. The limit, once established, may be expected to rise with the gradual improvement of the profession, which will certainly continue. A clear definition of professions and trades may fairly be counted one of the civilizing influences to whose progress our correspondent looks for the remedy of wrong selection among them.

We have before this intimated our distrust of the national capital as a suitable soil for the growth of art, yet it is impossible to withhold our sympathy from such public-spirited endeavors as those of Mr. Corcoran. Not satisfied with having spent a quarter of a million of dollars upon the gallery at Washington which he has presented to the public, a like sum on the collections which it contains, and a million upon its permanent endowment, Mr. Corcoran is resolved to go farther, it is said, and carry out his plan of founding a complete academy of fine art, which he hopes to make the chief centre of artistic inspiration in the country. The curator of the Corcoran Gallery, Mr. McLeod, in a recent address, said that the scheme for such an academy had long been matured, and was only waiting the removal of a certain obstacle, which is believed to be the difficulty of purchasing the land that adjoins the present gallery on Seventeenth Street. This difficulty overcome, there would follow the establishment of "a free school of art, with every facility for the study of drawing, painting, modelling, wood-engraving, photography, every branch of the art of design, and for the promotion of the industrial interests of the land. . . . . From this proposed academy will go forth [it is expected] not only painters and sculptors, but skilled artificers and draughtsmen fitted to fill the wants of the Government in its various departments, to supply which it has been necessary to send to Europe." A scheme of magnificent proportions certainly, even if a little mixed in idea, and one which its energetic projector might be expected to carry out in its main purpose as far as endowment and organization could carry it out. Yet when one remembers with what stubborn inertia the capital has resisted every effort to develop it, and most of all in any artistic direction, how hostile its whole atmosphere, social, political, and moral, is to the spirit of art, one cannot refrain from wishing that this splendid liberality could be persuaded to spend itself on some more genial ground.

A queer case lately decided in London illustrates at once the danger to which an obstinate architect may expose himself, and the extraordinary penetration, amounting almost to clairvoyance, of a British jury. A certain decorative painter had been employed upon a house which, according to the London custom, was repaired by a lessee at his own expense, subject to the approval of the landlord. The principal parties, lessee and landlord, were represented by their respective architects, and the painter contracted to do his work to the satisfaction of both of these. When the work was finished, including a certain amount of "extras," it was accepted by the architect of the landlord and rejected by the lessee's. The lessee therefore refused to pay the balance which would have been due if the work had been approved. The painter sued him, and recovered the amount of his bill of extras; but his claim under the contract was disallowed, on the ground that the architect had refused to accept the work. Not discouraged, the painter then brought suit against the architect for the unpaid balance, alleging that he had done his work properly, and moreover that the architect had admitted to him that the work was satisfactory, though he refused to approve it. The judge laid it upon the jury to determine the state of the architect's mind, charging that if he really was dissatisfied with the work the plaintiff could not recover, but that if he only pretended to be so he must pay the bill. The jury decided that the architect was satisfied, and awarded the painter the balance of his claim. In the light of this case it appears important for an architect to know his own mind. If he does not, an intelligent jury will find it out for him, and may make him pay severely for his uncertainty. There is apparently no remedy, unless the client should come to the rescue and pay the architect for work for which he had refused to pay the painter; for it is not likely that the architect could recover judgment for work that he had himself refused to approve.

AMERICAN VERNACULAR ARCHITECTURE.

III.

The journals and periodical literature of the day are noticing Mr. Holly's new book on Modern American Dwellings[1] with more or less of such shallowness of comment as is usually vouchsafed to architectural matter by the general critic. In all books, which, like this, undertake to record a phase of reform or transition in any branch of architecture, there are essential points which can hardly be reached by a lay observer; but in the proper consideration and analysis of these points lies a part of contemporary history.

We lately (p. 182) referred to the second volume of Woodward's "National Architect" as a fair record of the condition to which domestic architecture has attained in this country; we claimed that the architectural critic had no right to dismiss it with a sneer because of its obvious vulgarities and because of the absence of certain qualities which should commend it to the artist and the scholar, but that it is on the whole as fair a statement of our progress in this respect as has been set down in any book, and that it is, therefore, a safe point of departure for architectural development.

We believe it to be true that any design, especially in domestic work, which does not recognize some such vulgar starting-point, must be a mere architectural masquerade, interesting perhaps to the antiquary but without significance as a mark of architectural progress. No revival of old forms in new art is of any value, except in so far as it revivifies modern ideas with certain ancient forgotten virtues, and thus gives new strength, health, and interest to art, or at least serves as a justifiable experiment in that direction. But in studying any era of architectural development with a view to making use of its suggestions in modern work, it is difficult for the architect not to be fascinated by the style which he is considering, — difficult for him to avoid the temptation of introducing into his new work features full of the peculiar charm of ancient days without regard to any sacrifice of essential comfort which they may involve. Thus the neatness and precision of workmanship, which are the result of improved mechanical processes and belong especially to our era, are, under the impulse of this fascination, apt to give place to an affectation of the ruggedness and imperfections of old work; the modern clean-cut roofs with their smooth water-shed and straight ridges are displaced with a difficult imitation of the picturesque but leaky crookedness of the roofs of our ancestors; the comfort of weighted sashes, large lights, plate glass, and outside blinds, which modern ingenuity has given us, is obliged to yield to the sentiment and in-

[1] Modern Dwellings in Town and County, adapted to American Wants and Climate, with a Treatise on Furniture and Decoration, by H. Hudson Holly. New York, Harper & Brothers, publishers. 1878.

convenience of swinging casements, transoms, hoods, and small panes, as if the function of the architect was simply to furnish the scenery and accessories of a play.

It must be admitted that Mr. Holly, in frankly taking the position that the only prospect of a healthy advance in our domestic architecture is in reviving the essential features of the "Queen Anne Style," has managed to avoid many of the pitfalls which beset the architect of poetic feelings and delicate sympathies. His designs for country houses are plainly a development of the vernacular. This is their greatest praise and in this resides their most conspicuous usefulness as a contribution to the progress of art in this department. Our methods of wooden construction, our verandas, our eave-sheltered walls, our smooth, workmanlike roofs, are all retained (although our outside blinds are not recognized in the drawings or reconciled with the new things), and with them are combined the galleries, the great chimneys, the balustered porches, the panellings and the conventional sun-flowers attributed to the earlier Georgian era, so as to make up a whole not destitute of a certain air of originality and piquancy, — a whole which is distinctly American and not English, — a sublimated derivative from the Dutch or Yankee wooden farmhouse. The plans are nearly all ingenious — some of them exceptionally so — and their idiosyncracies are on the right side. Large habitable halls well opened into the adjoining living rooms, stairs almost always very cleverly contrived with embayed and oriolled landings, dining rooms in every case connected with the kitchens by a direct passage through the butler's pantry (a clear concession to American habits), — these are the distinctive features of the plans; but we do not remember any mention in the text, nor any especial indication in the plans, of the arrangement of rooms according to the points of the compass — a most important and difficult part of planning; the question of exposure to morning or afternoon sun, or protection from prevailing winds, of aspect in short, in all its bearings, is not touched upon even in the chapter on Site, — an omission not surprising in a layman but hardly to be expected in an architect of Mr. Holly's experience. The roofs, however, are always well composed and interesting as a part of the design, and the verandas and balconies are ample and convenient, although, as we have said, their relation to aspect and view is apparently not considered.

Each design is illustrated by a ground-plan and a perspective sketch, and accompanied by an estimate of cost with a descriptive chapter. These are interspersed (without any especial relationship however) among a series of chapters, which are in the nature of brief essays, devoted to such subjects as Country Life, Site, Plans, Building Materials, Specifications, Framing, Roofing, Glass, Chimneys, Costs, Architect's Duties and Charges, Plumbers' Blunders, Heating and Ventilation, and Alterations. There is but one town-house given, and this is explained in a chapter on City Architecture. These chapters are addressed to laymen, and set forth the commonplaces of information, such as professional men are most frequently called upon to give to their clients. This part of the work is done in a homely straight-forward fashion, and embodies a desirable explanation of the functions of the architect.

The greater part of this book, it will be remembered, appeared in *Harper's Magazine* two years ago, and we are glad to see that Mr. Holly, in the chapters relating to interior decoration and furniture, has taken pains to give his authorities as promised in his letter, quoted in these pages two years ago (vol. 1, pages 218, 234); we do not wish to seem captious upon this point, but it seems to us, so far as relates to the drawings borrowed from the *Building News*, from Dresser, Talbert, and others, that the acknowledgment should appear in each case in company with the title thereof, so that that vast majority of readers who derive their impressions of a book not from reading it, but from turning over the pages merely for the sake of the prints, may appreciate the authorship of these prints, just as the small minority does, which reads and inwardly digests the full text and finds the credit duly given therein in its place. This is a matter not only of courtesy but of custom.

The chief value of the chapters on Interior Decoration and Furniture resides in the hints given as to the proper relationship of the architect to the client in respect to these parts of the work. These chapters are thus brought into keeping with the rest of the book. But after Dresser and Talbert and Eastlake and Viollet-le-Duc, on the other side of the water, and the admirable popular summary of the whole question by Mrs. Spofford on this side, the treatment of the subject generally by Mr. Holly is meagre and insufficient. Even as a mere summary of the question, inserted in the book to give it symmetry and a more complete conclusion, the interior finishing should have been treated, we think, in a manner to give the reader an impression of mastery. Whereas our author too frequently allows himself to speak rather like a *dilettante* than like an architect, and when he ventures to enunciate principles, they are not only not original, which they might well have been from the point of view of his profession, but they embrace many of the narrow exclusions which were formulated by Eastlake, but to which an architect would not submit himself if loyal to those which control architectural design in its largest sense.

The function of architects in respect to interior decoration and furniture needs to be explained with great care, and the excellent opportunity here offered has not been properly availed of. But we are glad to see the first book on domestic architecture which gives due place to this important part of the subject.

PAPERS ON PERSPECTIVE.

X. THE PERSPECTIVE OF REFLECTIONS.

191. LET us now consider how things look in a mirror, whether in an artificial mirror, or looking-glass, or in the natural mirror formed by the surface of still water. The question is obviously a little more complicated than those we have been discussing, inasmuch as a new element is introduced. We have now to consider not only the position of the picture, and its relation to the position of the object reflected and to the mirror that reflects it, but also the relation of the object reflected and of the reflecting surface to each other. Either of these may be parallel, perpendicular, or inclined, to the others.

Given, the position of the spectator, that of the picture, that of the object, and that of the mirror, it is required to depict not only the lines and surfaces of the object itself, with all their vanishing points and traces, but the reflection of the object in the mirror, and the vanishing points and traces of the reflection.

192. In reflections, however, as in shadows, and as everywhere in perspective, the various problems of the point, the line, and the surface are all comprised in the problem of the line. How to draw a given line through a given point is the only question. For the perspective of a point can be got only by finding the perspective of a line, or of two lines passing through it, and a surface is drawn in perspective by drawing the perspective of the lines that enclose it.

The problem of reflections then is this: to draw the reflection of a given line in a given mirror. The position of the centre of the picture, C, is of course known, and the distance of the eye at the station point, S, in front of it; and the vanishing point of the line and the trace or horizon of the plane of the mirror; with the position of some point in the line and of some point in the mirror.

193. Let us first take the most general case, that of a line inclined to the picture, at any angle, taken at random, reflected in a mirror which is inclined to the plane of the picture and to the horizontal plane, in any position, taken at random.

This disposition is shown in Figs. 39, 40 and 41, which illustrate three successive steps in the solution of the problem.

In each of these is shown two sides of a room, making an angle with the plane of the picture, on one of which a mirror hangs at an angle with the wall. The plane of this mirror we will call, in pursuance of the system of notation adopted in these papers, the plane L M', since its horizontal element is obviously parallel to the floor-boards whose vanishing point is V^L, and its line of steepest slope descends to the right, in the general direction we have called M'. $V^{M'}$ will be below V^L, and T L M', the trace of the plane of the mirror, will pass through $V^{M'}$ and V^L, as shown. The position of the mirror is fixed by that of its lower edge where it intersects the plane of the floor.

The line whose reflection in this mirror we are to find slants upwards to the left nearly in the direction we have called N; but as it is not parallel to the plane L Z, we will call it O, its direction being given by its vanishing point V^O. Its position is fixed by that of its nearest point, whose distance above a point on the floor is shown.

Let us also call the direction of lines at right angles to the mirror, that is to say perpendicular, or *normal* to it, by the letter T, *norma* being Latin for T-square. They will be parallel to the *axis* of the mirror, and their vanishing point will be V^T.

194. It is obvious from the inspection of either figure that the reflection or *image* of the line will look like just such another line as far behind the surface of the mirror as the line itself, or object, is in front of it; and that a line drawn from any point in the object to the corresponding point in the image, that is to say from any point to the reflection of that point, will be normal, or perpendicular to the mirror, and will have its vanishing point at V^T.

All these normal lines together, moreover, make up a normal plane, also at right angles to the mirror, which may be called the plane O T. And as the trace of any plane passes through the vanishing points of all the elements of the plane, T O T, the trace of the normal plane O T, passes through V^O, the vanishing point of the given line, and through V^T, the vanishing point of normals.

And as, conversely, every line that lies in a plane has its vanishing point in the trace of the plane, O', the image of O, must have its vanishing point, $V^{O'}$, also in the trace T O T.

Finally, it is plain that the line I, in which this normal plane intersects the plane of the mirror, seems to lie equidistant between the given line O and its image O', and to bisect the angle they make with each other; and that since it lies at the intersection of these two planes its vanishing point must be at V^I, the intersection of their traces.

195. The problem of reflections is solved when the line I is fixed, and the point V^T. For the image or reflection of every point in the given line lies on a normal passed through the point, at a distance beyond the line I equal to that of the point itself on the hither side of it. This equal distance can be obtained, as known, by means of the method of triangles, using a line of measures drawn parallel to T O T and an auxiliary vanishing point. But for a complete solution of the problem it is necessary to determine also $V^{O'}$, the vanishing point of the image.

Fig. 38 shows how V^T and consequently V^I, are determined; while Fig. 40 and Fig. 41 show how I itself and V^O are obtained.

196. The first problem is how to find V^x, T L M' being given; that is to say, given a plane or system of planes by its trace, to find the vanishing point of the axis of the system, i. e. its vanishing point of normals.

The solution of this problem depends upon the principle already illustrated in Fig. 29, Plate VII., that "If a line is normal to a plane its projection upon a second plane intersecting the first is perpendicular to the line of intersection." For if we pass through the station point S, at a distance in front of C equal to the line C S_1, a plane parallel to the mirror, it will intersect the plane of the picture in the line T L M'; and if we pass through the same point a line normal to that plane and parallel to the lines normal to the mirror, it will pierce the plane of the picture at V^x; for if from the station point one looks in a direction parallel to the lines of any system he will see the vanishing point of that system. Now since the projection of the station point on the plane of the picture is at C, the projection of this line will be C V^x, and this line will be perpendicular to T L M' at the point *a*. *A line aC, then, drawn through C perpendicular to the trace of any given plane, will pass through the vanishing point of lines normal to that plane.*

197. If now a line be drawn from the station point to the point *a*, it will be at right angles to the line drawn from the station point to V^x. *a* S V^x is accordingly a right-angled triangle of which *a* V^x is the hypotenuse, and if this triangle be revolved into the plane of the picture about *a* V^x, S will fall at S_2, and a line drawn at right angles with *a* S_2 will give V^x at its intersection with *a* C prolonged.

198. V^x being thus ascertained, T O T, the trace of the normal plane, is drawn through V^x and V^o, and V^z is obtained at its intersection with T L M' (194).

199. Fig. 40 shows how the line I, at the intersection of the normal plane with the mirror, is determined in position; its vanishing point V^i being already found, it is necessary only to determine one point in the line I, upon the surface of the mirror. The line can then be drawn through this point and the point V^i.

But it is plain, from an inspection of Fig. 39, that if the line O were prolonged until it touched the mirror its reflection O' and the line I lying between them would be prolonged also, and that all three lines would meet at the point where O pierced the surface. This point, then, would be a point of the line I, such as we are seeking.

The problem resolves itself then into that of finding where a line pierces a plane, both being given in perspective.

200. To find where in the figure (Fig. 40) the line O pierces the plane of the mirror L M' we pass a vertical plane O Z through the line O; its trace is T O Z. The point *e* is a point common to the plane L M' and to the plane O Z, that is to say, it is one point of the line in which the vertical plane through O intersects the surface of the mirror, the point *f*, where the traces of these planes intersect, being the vanishing point of this line of intersection. The line *f e* prolonged is then this line of intersection itself, and the point *g*, where the line O prolonged meets the line *f e*, is the point where it pierces the mirror.

201. But the point *g* being also a point of the line I prolonged, a line drawn through *g* and the vanishing point V^i, gives the indefinite line I which we are seeking. Normals drawn through the extremities of the line O to V^x, cut off from the indefinite line I the finite portion required.

202. Fig. 41 shows how V^o, the vanishing point of the reflection of a given line, may be obtained, V^x, V^i, and I having already been determined, and O and V^o being given.

It is plain that O, I, O', and T, in Fig. 39, are all in the same normal plane, and that if from the position of the eye at the station point S in the air, in front of C, lines are drawn to the vanishing points V^o, V^i, $V^{o'}$, and V^t, these lines will lie in the plane which, passing through the eye, intersects the plane of the picture in the trace T O T. The lines S V^x, S V^o, S V^i, and S $V^{o'}$, will all lie in the same plane and will be parallel respectively to T, O, I, and O', and will make the same angles one with another. But since I bisects the angle made by O and O' (194), so must S V^i bisect the angle at S made by S V^o and S $V^{o'}$. If then in Fig. 41 we revolve the plane triangle V^t, S V^i, into the plane of the picture, the trace T O T and all the vanishing points upon it will remain where they are and S will fall at S_4. For the real distance from the station point to the trace T O T at *b* is *b* S^8, the hypotenuse of the right-angled triangle of which C *b* is the base and C S_3 = C S the altitude. This distance *b* S_4 laid off upon a perpendicular drawn through C, to the trace T O T at *b*, gives the point S_4.

203. From this point lines drawn to the several vanishing points on T O T make the same angles one with another, as do the lines O, I, O' and T, and since I bisects the angle between O and O', $V^{o'}$ is easily ascertained by drawing a line on one side of S V^i at the same angle that S V^o already makes upon the other side of it.

204. In these figures the mirror stands at an angle with the plane of the picture, and also at an angle with the ground. The case is somewhat simpler when the latter angle is 90°, the mirror being upright. The trace of the mirror becomes vertical, and the normal lines are horizontal. If in Figs. 39, 40, and 41 we imagine the mirror set back into a vertical position, it is clear that V^x will move so as to coincide with V^s, S^2 with S^1, and T O Z with T L Z; *f* will be at an infinite distance, and the line *eg* will be vertical. But the essential conditions of the problem will remain unchanged, and the trace of the normal plane, the point where the given line pierces the mirror, and the vanishing point of the image will be obtained as above.

205. If the object reflected is a plane surface, its reflection must be found by finding the images of the lines that bound it, and their vanishing points. These vanishing points will of course lie in a straight line, the trace of the reflection of the plane; this trace can be drawn as soon as the vanishing points of any two of the elements of the plane are ascertained. It is convenient to take one of these elements parallel to the mirror. (207.)

206. To obtain the reflection of a point, a line must be passed through it, and its image obtained as above. The reflection of every point in this auxiliary line, including the point in question, is then easily found. But it simplifies the problem, as we shall presently see, to take the auxiliary line either parallel to the mirror or perpendicular to it. (208.)

207. For the reflections of lines which are parallel to the mirror, being in every part as far behind the mirror as the lines themselves are in front of it, are also parallel to the mirror and to the line I, in which the normal plane intersects its surface. They are accordingly parallel to their originals, and have the same vanishing points.

It follows that if a plane is parallel to a mirror, all the lines in it retain their vanishing points, so to speak, in the reflection, and the plane retains its trace.

208. The images of lines perpendicular to the mirror also seem to retain their vanishing point, which is the vanishing point of normals, V^x. But it is more exact to say that the *other* vanishing point, 180° away, is reflected so that its image coincides with V^x. It follows that the reflections of planes perpendicular to a mirror have the same traces as the planes themselves; for the vanishing points of the parallel elements and of the normal elements are alike unchanged.

209. It appears then that *the reflections of lines and planes parallel or perpendicular to the reflecting surface have the same vanishing points and traces as their originals*, whatever the position of the reflecting surface.

210. The general problem of the reflections of lines and planes, whether parallel or inclined to the mirror, having thus been discussed, it only remains to consider the special cases in which the mirror itself is parallel or perpendicular to the picture. In both these cases the problem is a very simple one.

211. *When the mirror is perpendicular to the plane of the picture*, as in Figs. 42 and 43, the normals are parallel to the picture, their vanishing point is at an infinite distance, and the trace of the normal plane is at right angles to that of the mirror. The trace of the plane of the mirror passes through the centre C; the plane drawn through the station point S, intersecting the picture in this trace, is perpendicular to the picture; and lines drawn from the station point to the vanishing point of a line and to that of its reflection strike the picture at equal distances from this trace.

The vanishing point of the image of a line, then, inclined to the face of a mirror which is perpendicular to the picture, *is as far on one side of the trace of the mirror as the original vanishing point is on the other*, on a line at right angles to the trace.

If a line is parallel to the picture, so that its vanishing point is at an infinite distance, the image is inclined to the trace of the plane of the mirror at an equal angle on the other side.

212. If a plane is inclined to a mirror that is perpendicular to the picture, one element of the plane will nevertheless lie parallel to it, and that element will retain its vanishing point, which will lie in the trace of the plane of the mirror (209); every other element will, so to speak, shift its vanishing point to the other side of the trace of the reflecting plane (211). *The trace of the image will then cross the trace of the mirror at the same point with that of its original*, making equal angles on the other side.

213. *When the mirror is parallel to the plane of the picture*, having the vanishing point of its axis at the centre C, a line or system of lines inclined to the mirror has the vanishing point of its image *as far from the centre* C *in one direction as that of the line or system is in the other*, on a line drawn through the centre. If a line goes up and to the right, its reflection will of course seem to go down and to the left, at equal angles.

214. It follows that if a plane is inclined to a mirror set parallel to the picture the trace of its image *is parallel to that of the plane itself*, on the opposite side of the centre C, and equidistant from the centre.

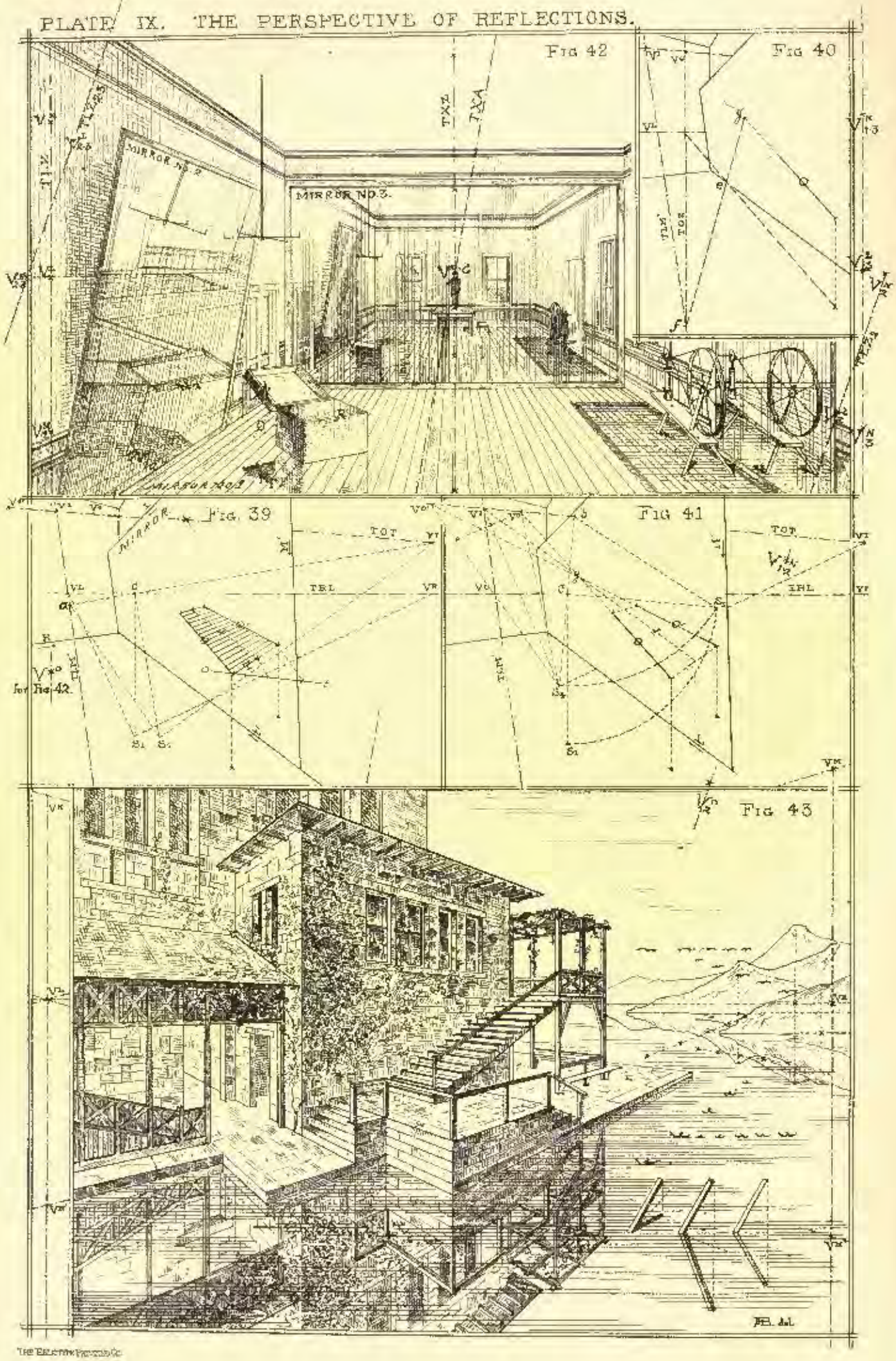
215. These points are illustrated in Figure 42. The spokes of the spinning wheel are parallel to the right-hand mirror, the axle is perpendicular to it. All retain their vanishing points.

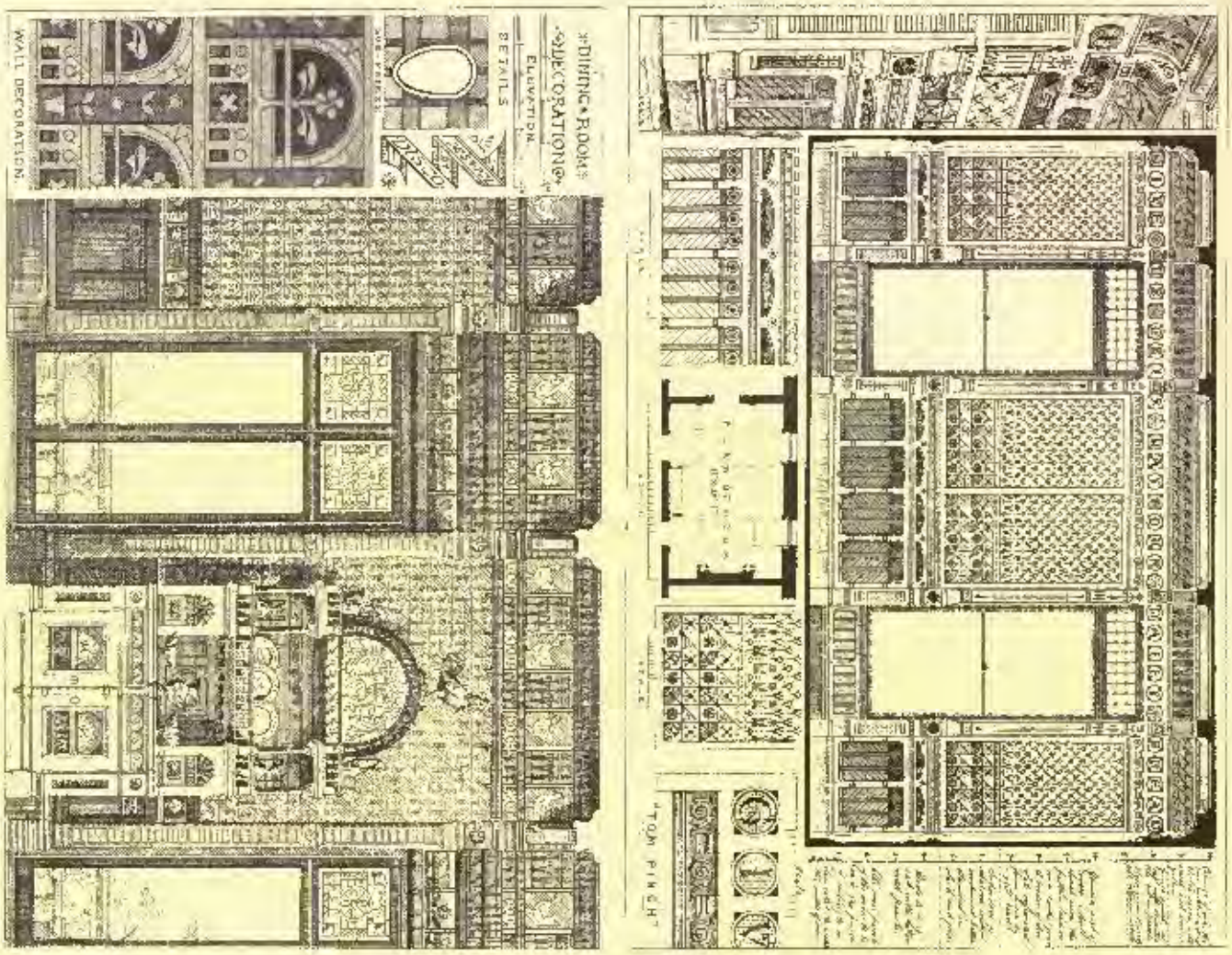
The box on the left, with its cover, presents four systems of lines, two horizontal, L and R; two inclined, N and O. The reflection in the floor retains V_L and V_R, but exchanges V^N and V^O for V^{nl} and V^{ol}, on the opposite side of the Horizon.

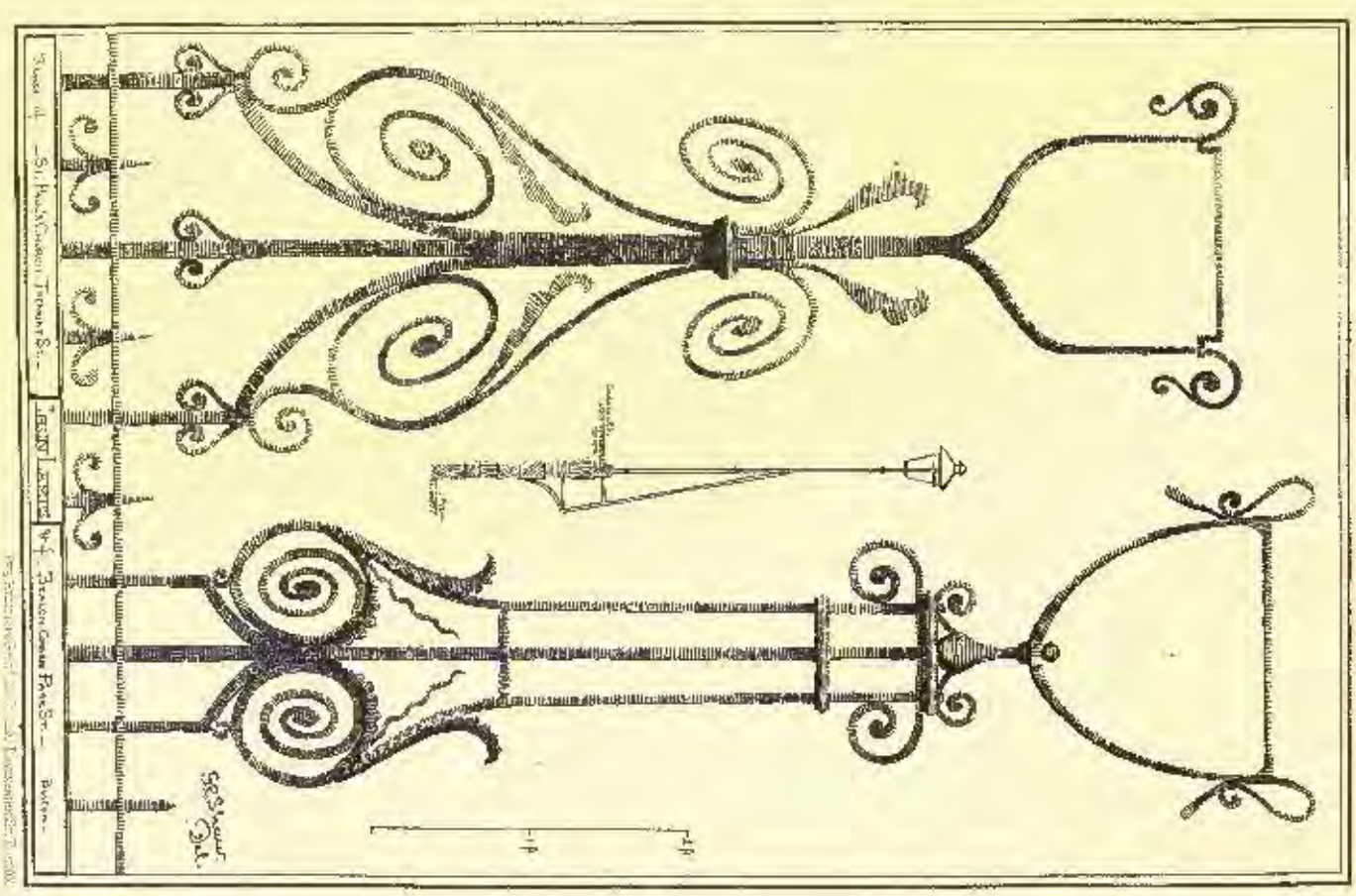
The reflection of the box in the second mirror, on the left, has for vanishing points V^L_2, V^R_2, V^O_2, V^N_2, across the trace of the mirror T X A, the plane L Z having T L Z^2 for its trace, inclined to T X A equally with T L Z. (212.)

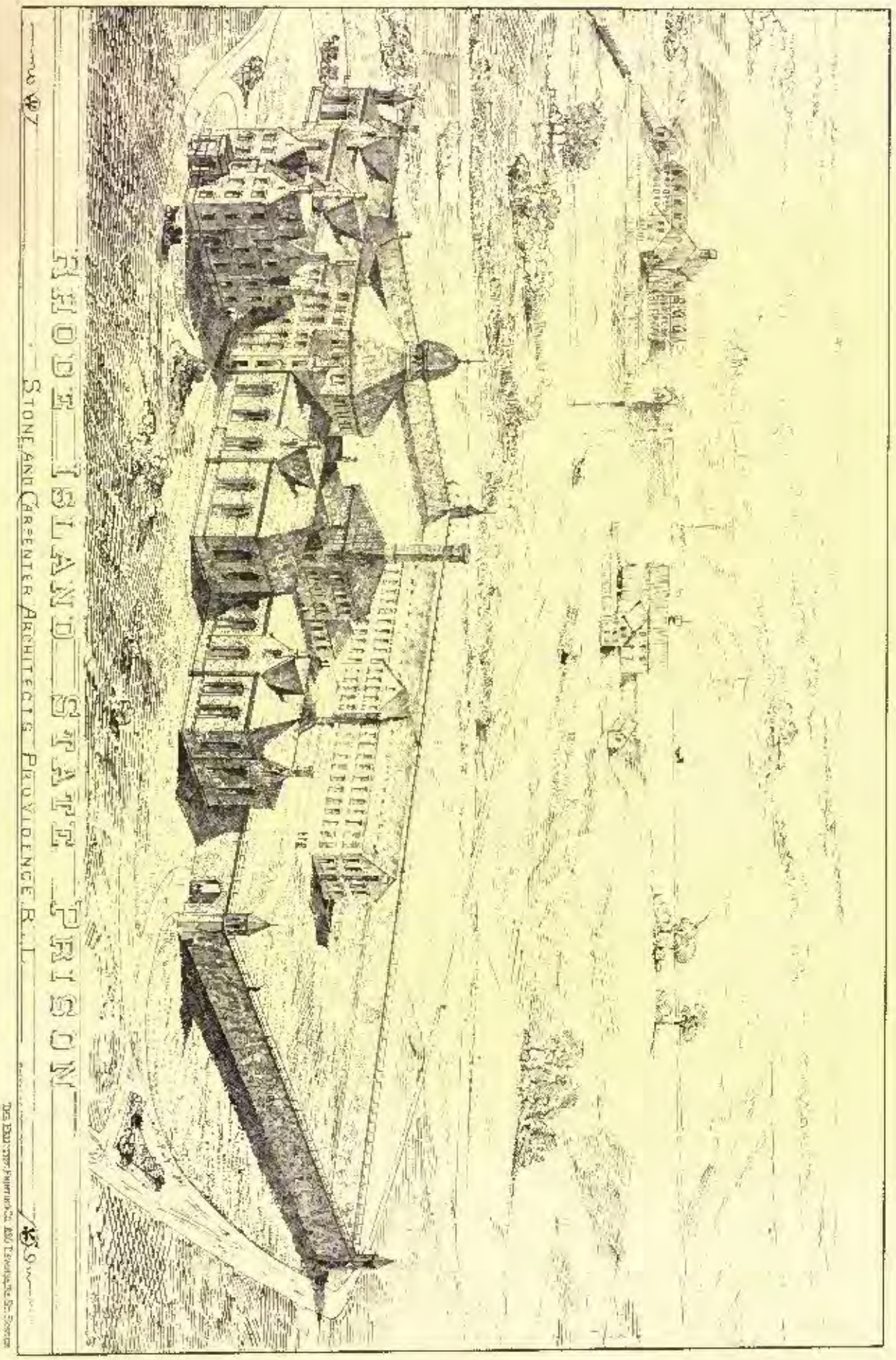
The third mirror, parallel with the picture, in like manner gives

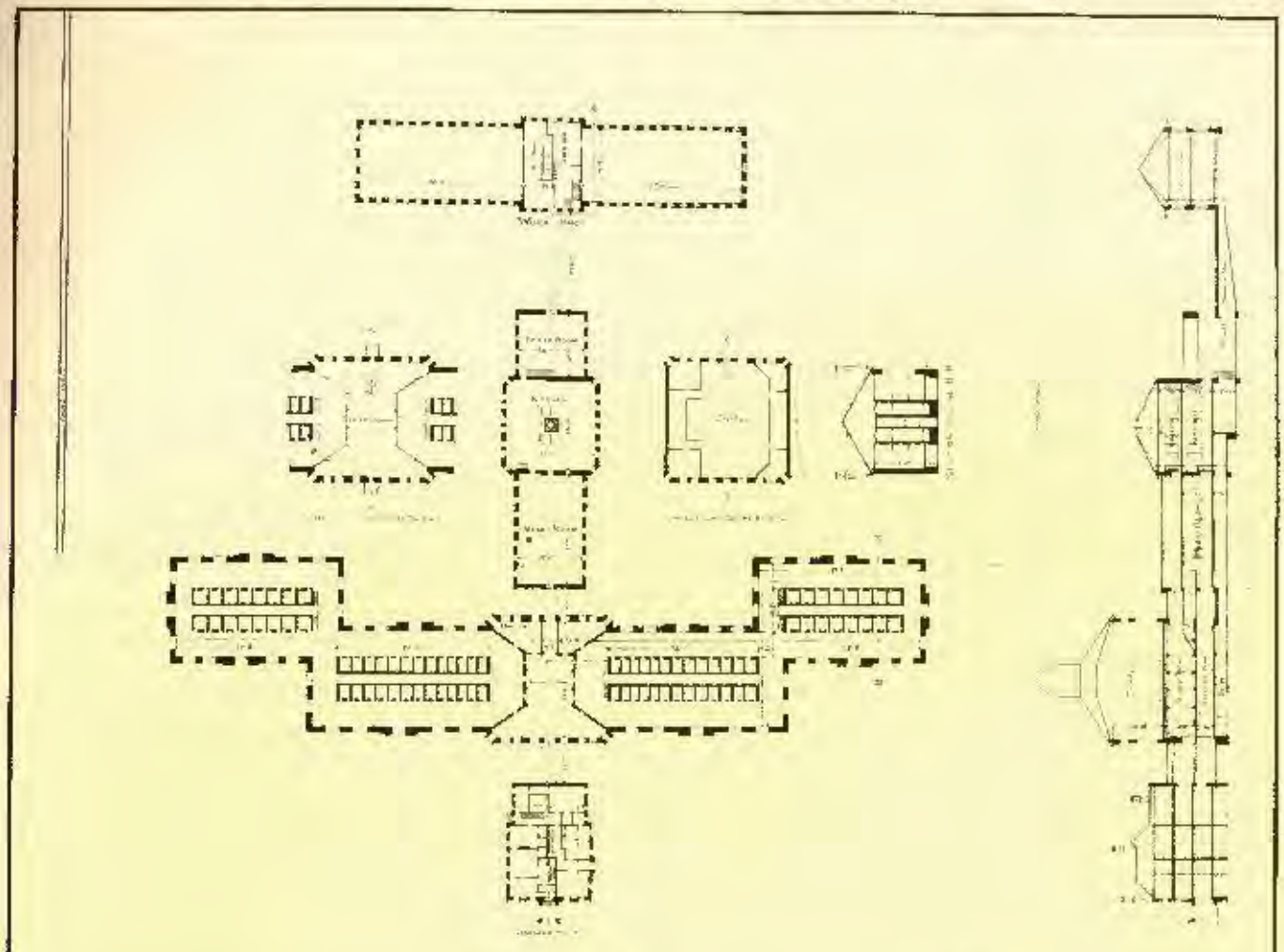
PLATE IX. THE PERSPECTIVE OF REFLECTIONS.



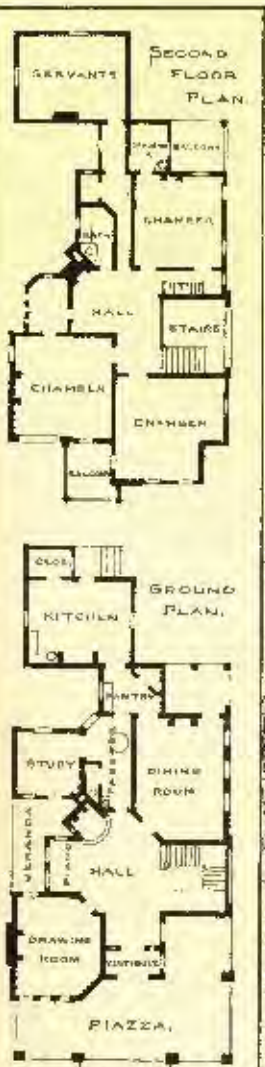

DINING ROOMS
DECORATIONS
ELEVATION
DETAILS
WALL DECORATION
TOM PINCH

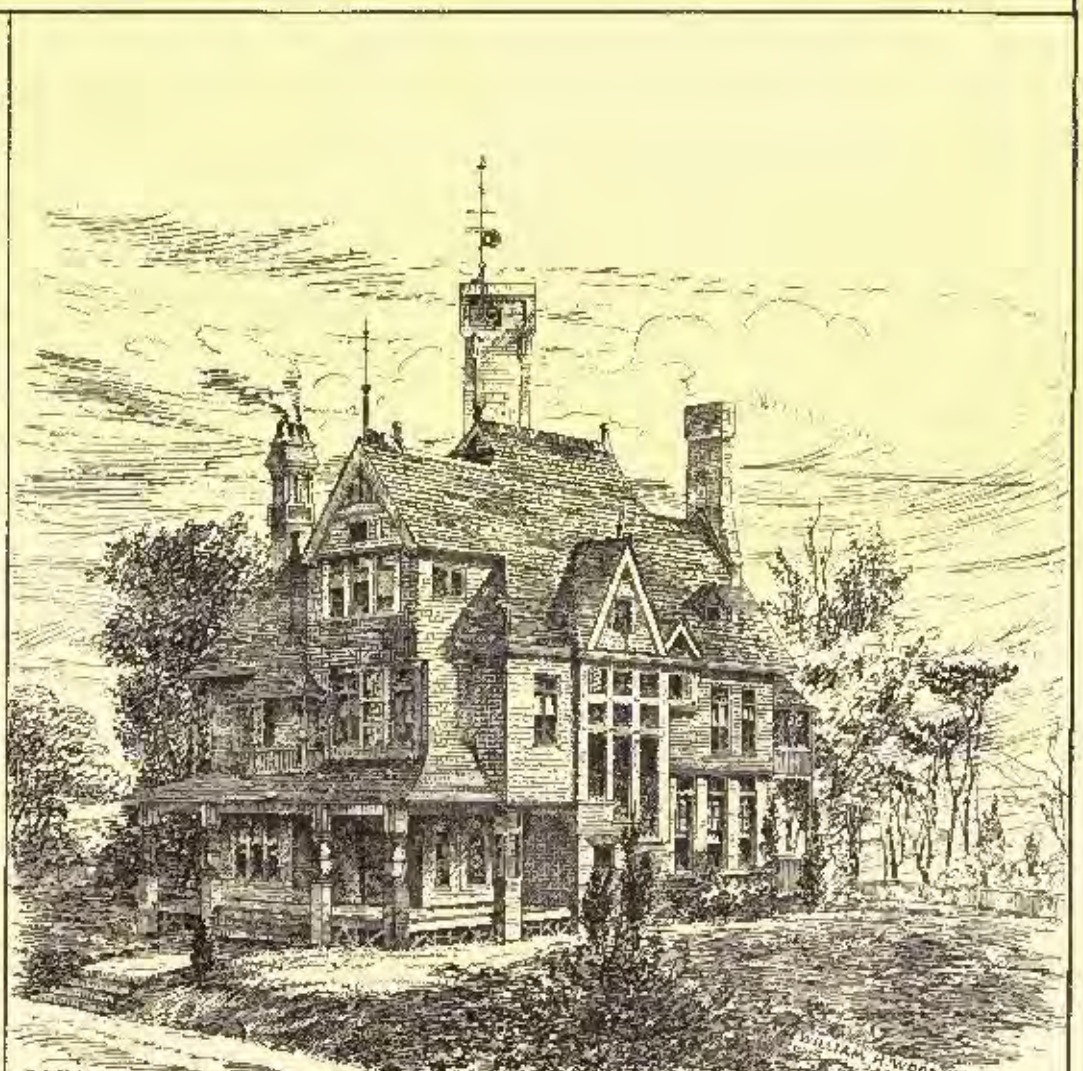



No 7
RHODE ISLAND STATE PRISON
STONE AND CARPENTER ARCHITECTS PROVIDENCE R.I.



PLAN OF BUILDINGS
FOR
RHODE ISLAND STATE PRISON





VIEW OF PROPOSED NEW DWELLING FOR D. SMITH WOOD, NEWARK, N.J.

THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST. BOSTON.

V_3^1, V_3^2, V_3^3 and V_3^4 for the vanishing points of the main lines of the reflection of box. (213.)

216. The reflections are themselves reflected just like their originals, as in mirror No. 2. V_{13}^4 is the vanishing point of the lid of the box, reflected first in the polished floor and then in the inclined mirror.

217. Fig. 43 illustrates these principles by the phenomena of reflections in water, a mirror perpendicular to the plane of the picture.

The steps have their vanishing point at V^s and $V^{s'}$, their reflections at $V^{s'}$ and V_s, respectively.

218. It is to be observed that the phenomena of reflection enable us to determine the real distance of isolated objects, such as birds or distant mountains, the point on the plane of the water directly below them being midway between the object and the image. The distance of this point is the horizontal distance of the object.

It is also to be noticed that the different size and inclination of the sticks in the foreground, which are not very obvious in themselves, are made conspicuous by the difference of their reflections, as it would be indeed on solid ground by the difference of their shadows. These objects exhibit very clearly the relation of a line and its reflection to the normal plane in which they lie, and to the line in which this plane intersects the mirror.

THE ILLUSTRATIONS.

RHODE ISLAND STATE PRISON. MESSRS. STONE AND CARPENTER ARCHITECTS, PROVIDENCE.

WROUGHT-IRON LANTERN STANDARDS. DRAWN BY MR. G. R. SHAW, ARCHITECT.

These examples of wrought-iron work are possibly as good examples of old iron work as are to be found in Boston.

DESIGN FOR A COUNTRY HOUSE AT NEWARK N. J. MR. W. H. WOOD, ARCHITECT.

DESIGNS FOR A WALL-DECORATION. — COMPETITION NO. III.

We have decided that it is perhaps worth while to publish two more designs which a more considerate inspection shows to be well-studied schemes and worthy of attention.

STUDY IN PERSPECTIVE. — PLATE IX.

See "Paper on Perspective," in this number

CORRESPONDENCE.

DECORATIVE ART SOCIETY. — A PRIVATE COLLECTION. — THE BUILDING LAW.

BALTIMORE, May.

FOLLOWING the good example of New York, Baltimore is at this moment organizing a Decorative Art Society, with a constitution and purpose similar to those of the one now in operation in the "metropolis;" the chief subjects to be handled being china-painting, artistic draperies, furniture decoration, and needle-work. A large majority of both the working and passive members are to be women, while one fourth of the members only is to be men. For the last few years so much amateur interest and talent have been shown in the city in these branches of artistic work that there is every prospect of success for a society of this kind; but it seems absolutely necessary that it should start with a well-systematized instruction department, to control and guide the somewhat erratic taste of enthusiastic patrons, and to select work of real merit from much that will be either simply commonplace or ridiculously grotesque.

The private picture-gallery and collection of Japanese and Eastern art of Mr. W. T. Walters, at his residence on Mount Vernon Place, have lately been thrown open, but are now closed for an indefinite period. The pictures are well known, as this gallery is frequently opened to the public, tickets being sold for charitable purposes; they are entirely of the modern school, and as a whole this is one of the most valuable private collections in the country. The gallery itself is very attractive in all its arrangements, containing only original works, and among the well-known artists represented on its walls are Gérmon, Bonheur, Détaille, Fortuny, Jules Breton, Cabanel, Delaroche, Meissonier, and many others.

Mr. Walters has gradually converted almost his whole house into an art museum. The drawing-rooms are furnished with either original pieces or careful reproductions of the most artistic styles of the Queen Anne and the Louis Sixteenth ages, and the cabinets contain many exquisite gems of porcelain from the factories of Dresden, Sèvres, Worcester, etc., and also many beautiful bronzes and specimens of old silver. The dining-room, wainscotted to the ceiling in light wood, is ornamented with a wide frieze painted on canvas, representing, in the form of a continuous landscape round the room, the low, marshy banks of the Chesapeake Bay, with their thick growth of reeds and flags, among which are seen all the various species of water-fowl, with which they abound, — the game Baltimore is so famous for, — very carefully and beautifully drawn. This was executed in Paris, specimens of the birds being sent over as models. The rooms in the upper stories of the house are not usually shown to visitors to the gallery, but recently, upon the completion of the classifying and arranging the Japanese collection, invitations were sent to a small number of persons known to be particularly interested in art matters, and these rooms kindly opened for their inspection. A small bedroom is first seen, fitted up entirely *à la* Marie Antoinette, with original or faithfully copied details, pretty and luxurious, but more commonplace and less interesting than another bedroom in the old Dutch style, with a small, stiff, uncomfortable four-posted bedstead two hundred years old, a huge old wardrobe aged about two hundred and fifty years, a large trunk or chest loaded with brass clamps and complicated locks, and tiles, plaques, jugs of old Dutch blue china about the mantle and shelves, and the window hangings and wall covering of embossed leather, copies of actual work of that period.

By far the most valuable and interesting room, however, is that for the Japanese and Chinese porcelain, lacquer ware, bronzes, ivory, etc. Mr. Walters has been for the last twenty years gathering together and arranging these articles, and the result is a collection in many respects surpassing all others of the kind; so much so that during the Philadelphia Exposition some of the Japanese artists visited this room for the purpose of studying and sketching some of the specimens rarely found even in their own country. Specially interesting is the blue and white ware of both China and Japan, the lacquer work, and the exquisite workmanship of the sword-hilts and medicine caskets, the only articles of jewelled ornament worn by men of rank of that nation. One magnificent vase in green and yellow is remarkable for the design of the *five-clawed* dragon, which was allowed to be put only upon articles specially manufactured for some member of the imperial family.

Work has recently been resumed on the building of the Young Men's Christian Association; the interior is now to be completed and fitted up. The exterior is principally notable for its size, unsuggestiveness, and commonplace details.

As a result of investing in cheap, contract-built houses, we have lately heard of one, 20′ by 70′, with white marble front, purchased for $11,500 in fee. Subsequently it was discovered that there was not a single trap to the soil-pipes, and the entire plumbing had to be reconstructed. The purchaser had taken a "bond of indemnity" from the builder, freeing the house from all workmen's claims; but the builder proved irresponsible, and the house is now covered by numerous liens.

The corner-stone of the Roman Catholic Church in memory of Pius IX., Mr. George A. Frederick, architect, was laid lately, with elaborate ceremony. The church will be of Falls blue stone and white marble, and will cost something like $100,000.

The building law, which the Baltimore chapter has been laboring for several years to have passed by the city council, has recently received an additional blow in the shape of a protest signed by various builders, on the ground that it is too binding and strict; rather a remarkable objection, as the law is the mere skeleton of those already in operation in several other cities. W.

BUILDING ACCIDENTS. — NEW BUILDING FOR COLUMBIA COLLEGE — THE LEGAL DEFINITION OF A STOREHOUSE.

NEW YORK.

THERE has been a great deal of clearing out and tearing down in New York property during the present season; the old-fashioned, low, and in general poorly built structures are found expensive when cumbering property in the business portion of the city and liable to heavy assessments. A few historic buildings have come down. The old Gotham on the Bowery and the Park House on Beekman Street had about them many an interesting bit of history, and the old New Yorkers have been busy telling odd and curious tales of years ago. Many old wooden rookeries have fallen before the wreckers' bars and axes, though the architectural improvement in the iron structures which take their place is not very marked. When so much might be done in adding to the beauty of our streets, it is disheartening to see commonplace edifices going up one after another on every thoroughfare.

In the tearing down, the best of caution has not been shown, and the result has been a loss of several lives by falling walls. In the Louhat Building in Mercer Street, the work of demolition had reached the second floor, when, in prying out a beam which the workmen did not know was a trimmer-beam on one side of an old hatchway, long before boarded over, the beam fell; others went with it, pulling over a section of wall. A half dozen workmen were buried; one was taken out dead, and others fatally injured. The day following a report came that a floor in the Sixth Avenue Railroad Depot had fallen, with loss of life, as has already been described in this journal.

Turning from such obtrusive and unpleasant incidents, one or two new pieces of work promise to leave the spring not altogether bald of interest. The Morse building, by Farnsworth and Silliman, architects, will be an important addition to the lower end of the town; and now Columbia College has entrusted to Mr. C. C. Haight the building of a new wing to the academic department. The new building will be about 200 ft. x 55 ft. on the western end of the college green. The outer walls are to be of face-brick, in black pointing, with the light-tinted Potsdam sandstone as finish. The style might be called the Oxford mode, or very late Gothic, best seen in much of the collegiate architecture of the English university towns. The building will be low and long, having above a high basement, three stories and an

attic. The western flank will have no entrance, but opens upon the inner or quadrangle face, in the centre of which is a broad, projecting porch with groined ceiling, while over it is an oriel window, corbelled out into a conspicuous feature, and rising up into the attic story. Besides this central projecting pavilion are simpler ones at either end of the building, the roofs over these portions presenting gable fronts. The windows are broad, mullioned ones, arched in the lower stories and with square-headed lintels above. Within, the halls and class-rooms will be finished in brick of a light tint, with a strongly contrasted pointing. The entire construction it is intended shall be fire-proof, with iron beams and Tell-block filling. The wood finish will be in oak, with iron frames. The heating will be by indirect radiation, though heat by direct radiation will be gained by two fireplaces in each class-room. These fireplaces will be made important features in the angles of the rooms where they occur, while the chimney stacks throughout are skilfully employed to break up the length of the building. The cost of the whole will be $200,000.

A rather novel decision from the counsel to the Department of Building promises to render null much of the effort of the Superintendent towards rendering storehouses secure. The law requires that in every warehouse or storehouse, the weight which the floor can safely carry shall be calculated and the figures posted up in a conspicuous place, and any overloading to be summarily punished. It is now decided that a storehouse is one in which goods are placed to be kept and removed again without breaking bulk. Places where they are kept for sale or for exhibition, counsel decides not to come within the rule, and it is precisely this class of structure that needs the most watching. Under this ruling the Sixth Avenue Railroad Depot break might have gone on without posting, and in a thousand buildings where coffee, flour, paper, and other heavy goods are kept the precautionary rules will not apply, though the power given the Building Department to see to it that all buildings within the city limits are of proper strength will not relieve it from blame in case of accident through neglect. W.

THE BOSTON PARK PLANS.

Boston, June, 1878.

The Park Commissioners have gratified the very natural curiosity concerning the designs for the proposed Back Bay Park by placing the designs on exhibition in the large committee-room at the City Hall. They have been inspected with more or less intelligent interest by a large number of persons, and we venture to guess that the commissioners themselves and the successful competitor are the only ones who have not been astonished at the award. Indeed we are by no means sure that Mr. Grundel himself did not feel a mild surprise when he saw the other designs, and found his own preferred to all of them. We presume it would be too much to expect the commissioners to give the inquiring public a reason for their extraordinary choice, but we should be glad to know what were the merits which they discovered in Mr. Grundel's plan which in their judgment entitled it to the preference.

Two courses were open to a man setting himself to study the capabilities of this little patch of marsh. One was to create at great cost of time and money, a diversified surface of hill and valley, of land and water, of wood and lawn; to reproduce in miniature all the scenery of a "lake district;" and to fill in all the nooks and corners cunningly with terraces and belvederes and boat-houses, casinos, bridges, and arbors, and all the devices known to the professional landscape architect. This is the method of the Central Park of New York, and is not unreasonable in a tract of land covering two or three thousand acres, upon which the possible expenditure was limited only by the resources of a treasury which even the Tammany Ring could not exhaust.

The other course was to confess frankly that this park was but a small affair, and to decline the attempt to make it imposing, or to include in it all the features of the natural landscape, but to so vary its limited and flat surface with alternating land and water, and so dispose the masses of such foliage as it was reasonable to expect in such a place, as to create an agreeable pleasure-ground at a small expense, and trust for effect to the unfailing beauty of broad surfaces of water and broad spaces of lawn, when skilfully broken by trees. The one method is simple; the other is ambitious. The one park is inexpensive to make and to keep; the other is costly at the outset, and demands a great annual outlay. Either might be intelligently chosen and consistently carried out.

Mr. Grundel has chosen neither. He has given a considerable proportion of the space at his disposal to the pond, and has made it wriggle the whole length and nearly the whole breadth of the park, so that there is at no point land enough left between it and the boundary to make a respectable lawn. But he has neutralized all the advantages of a large and fine sheet of water which he might be expected to secure by such a course, by tormenting his shore line, so as to form a distracting and absurd succession of gulfs and peninsulas and islands, which everywhere contract the breadth of the pond, and which would infallibly prevent any free circulation of water, either salt or fresh. Boylston Street and the railroad chop brutally across the territory without attempt at concealment or management, and the only flight of fancy or invention anywhere indicated consists in a rustic summer-house or two dropped at random in spots no more suggestive of repose or of prospect than any other, and in half a dozen bridges of similar design thrown across the narrow straits, which separate the peninsulas aforesaid from the main land. No massing of foliage is attempted.

In strong contrast with this rather childish plan are the three projects of Messrs. Lee and Curtis, Messrs. Bowditch and Copeland, and Mr. Adams of Medford, all of which have been studied and elaborated with evident care and skill, though in obedience to varying theories.

The plan of Messrs. Lee and Curtis is the most beautifully drawn of all in the room. It is also, if we mistake not, the only one which has recognized the unwisdom of encumbering this little space by a carriage-drive. It has as an offset made the surrounding streets into an attractive drive by giving them a breadth of a hundred feet or so, and sinking the surface of the park from five to twelve feet below them, and so allowing them to command pleasant views over its surface. The pond here occupies, as in Mr. Grundel's plan, nearly the whole length of the park, and towards the north end has a breadth of some eight hundred feet. This would be a fine feature, but purchased, as it seems to us, at too great a sacrifice of lawn, since it nowhere allows any breadth of grass greater than four hundred feet, and this only at a single point. Some pleasing architectural features are introduced, as a terrace in two levels, at the termination of the Westland Parkway, looking across the water at its broadest part, with a boat-landing over against it, and a lookout-tower raised on a wooded hill thirty feet above the water. The ugly but unavoidable feature of the railroad is concealed by grading up the surface on either side above the level of the track, and by thick planting. Boylston Street, as in most of the plans, is deflected from a straight line by a gentle curve to the north, but without materially raising the grade. The crossing of Commonwealth Avenue is peculiarly treated; the avenue being contracted into a bridge eighty feet wide across two square basins. The approaches or parkways, with the exception of that from Beacon Street, are treated as broad malls with from four to eight rows of trees. That from Longwood Avenue is particularly imposing.

The plan submitted by Messrs. Bowditch and Copeland is artificial and sophisticated beyond any other, but is intelligent and well studied. Boylston Street is here carried across the park on a viaduct, with a tall watch-tower at the end of it, — the line being curved as in the plan last noticed. This viaduct is bordered on one side by a labyrinth, that stupidest of all the devices of the formal gardens of the eighteenth century, and on the other by the lake, which is, as in both the plans before noticed, extended to nearly the whole length of the park, but contrives to make room in the middle for a straight cascade some nine hundred feet long, with a foot-path on each side. What small remnant of grass is left by this treatment is cut up in all directions by the inevitable driveway, with its high-sounding *concours* for carriages. There are thus no broad spaces either of land or water. A tunnel is built over the railroad and covered with grass. The intersection of Commonwealth Avenue is laid out as a square, turned diagonally with the avenue, with a circular fountain and a *gazebo* (odious word) in the middle. The parkways are gardens. This plan is accompanied by an admirable water-color drawing, showing a bird's-eye view of the park, with the river and the shore beyond.

The plan of Mr. Edward P. Adams, of Medford, is hung so high on the walls that it cannot be studied without difficulty, particularly as the execution is delicate rather than strong. But it well repays a careful study. It is perhaps the simplest plan in the room. It is also, to our mind, the one best adapted to the conditions and requirements of the case. It has less water than the plan of Messrs. Lee and Curtis; but what it has is made the most of, and is so placed as to allow of two great stretches of lawn, one called "the North Green," and the other "the South Green," the one perhaps a thousand feet each way, the other longer and narrower. On these the foliage is indicated as massed broadly and effectively, so as to enhance their apparent size. The driveway is carried near the boundary of the park, and is not allowed to encroach on the broad lawns. The Commonwealth Avenue crossing is laid out as a *road point* with radiating paths, and the parkways are shaded malls. Boylston Street is coolly brought to a full stop at the boundary of the park, which would be greatly to the advantage of the park, but a sad disappointment to Boylston Street, and which would, we presume, not be permitted by the city government. Mr. Adams has refrained, wisely as it seems to us, from any of the artificial and architectural features which have done so much for some of the other plans, and his plan is perhaps on this account inferior in elegance to some others; but we think his park would not be the less beautiful, while we are certain it would be much more suited to the present condition of affairs, when every outlay of the public money is watched and ought to be watched with a jealous interest by all well-disposed citizens. Besides, we are to remember that this little park is but the first of a chain which we hope eventually to see stretching from the Common far out into the suburbs and around the city, and it would be absurd to lavish upon it all the resources of the landscape gardener, and leave no surprises for the visitor who goes further. A.

Every workman on the Paris Exhibition building has received a present of a Bible in the French language.

Natal Pottery. — Fragments of ancient pottery found in Natal bear a very close resemblance to the pottery made by the ancient British.

THE QUALIFYING OF ARCHITECTS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — The communication in your late issue, and other papers on the same subject, seem to treat rather of the proper tests for determining the amount of qualification in given cases, than of fit systems of training for professional work. Such tests even would be imperfect and delusive if not repeated at frequent intervals and made to include many matters not treated of in books. The ability of any one to build well, in every sense, depends upon many qualities and attainments beyond the reach of school and college manuals, and often not to be gained by any teaching.

The world and the profession are supposed to move. The art and science of to-day are beginning to sneer at the infallibility of the past. The knowledge that would have served an American architect very well twenty years ago would now prove an uncertain reliance. No one claims that the builders of the antique world, whose works are beyond cavil and whom all agree to worship, had much more than the inspiration of genius and masons' traditions, or the "rule of thumb" to guide them. "The inspired mechanic" of the future might have a better chance in competition with an uncertified architect than with a certified one.

Professional success depends upon daily changing conditions; one's powers, habits, and knowledge vary with time — what was true yesterday may be false to-morrow. Examinations, to be of value, should not be restricted to the limited field indicated. As a groundwork of any professional success, a university or scientific-school education is important; and to the thorough study of architecture a knowledge of the principal languages, living and dead, is an essential aid. But all the learning implied in such education, in order to attain eminent practical success, must have added to it great natural qualifications and life-long study. It is difficult to determine in advance the direction in which one's practice may lead, and which of the branches of science and art may be most useful in actual work.

An architect's experience ranges over an immense field, and he must be prepared in all parts alike. His destined work is building; and his success is to be determined by the success, in all particulars, of what he builds. In such labor there becomes necessary a thorough knowledge of "business" and "affairs," and of what is known as "administration;" a familiarity with building and real estate law, with special reference to the law of contracts, and a general acquaintance with land surveying. As his business is to treat with clients, and direct and control men of all classes, in him more than in most is needed great patience and power of self-control, an intimate knowledge of human nature, and an instinctive power to command and lead men: and this should be united with gentle and attractive manners; for when he cannot command he must be competent to persuade. These qualities are as essential in the control of an office as in intercourse with clients and the superintendence of building. An architect may make or mar his work by his treatment of subordinates.

Moral qualities should be allowed due weight. A dishonest man, and still more one of generally bad character, is not fitted for important professional trusts. Buildings may fail as much from the criminal recklessness as from the incompetence of their designers. Few would claim that the most of our railroad bridge builders are not able to build strong enough if they choose, or are paid to do so. A proper examination should surely not omit a thorough investigation of character.

An architect should know how to write both accurately and concisely, as well as gracefully. His contracts and specifications, his correspondence with distant clients, his reports and written explanations and directions, all demand these qualities in a high degree of perfection.

At least an elementary practical training in all branches of mechanical work that are likely to come under supervision are essential to proper qualification. A knowledge of geology, botany, and mineralogy is essential. A thorough study of old work, and an equally thorough practical study of new building processes and materials in new work, such as can only be gained by extensive foreign and home travel, cannot be omitted from one's preparatory studies; and these studies, to be intelligent, should come after preliminary education, and even after some office experience. Nothing of scientific or practical acquirement can be said to come amiss to the architect; or even may not at any time be essential to the competent treatment of some particular work, and it would be a mere waste of words to prolong the list of items.

In artistic qualifications for success there is even less limit than in the scientific and practical. Drawing, painting, etching, modelling, carving, all can be pursued with profit, with many variations and to an indefinite extent.

"Life is short, art is long;" and the weary youth aspiring to reach the gate which shall open to him rich pastures of architectural practice, where he may browse in ease with his certificate of competency pinned on his back, may find himself with barely time remaining to design his own monument.

To be serious, — while we are all struggling to learn all we can, and build as safely and as well as we may, is the time quite ripe for drawing such sharp lines, and do other new professions in a new country do the like? And are there not crying abuses in our daily practice requiring more earnest attention than this demand for "certified qualification?" There is no such thing as absolute perfection in this world. The public often insist upon employing quacks and charlatans, and they have as fair a chance to judge of such among architects as in another profession. The consequences of wrong selection injure both the profession and the people, but the evil can be only fully remedied by the general progress of civilizing influences.

JOHN A. FOX.

COMMON COUNCILMEN AS ARCHITECTS.

MILWAUKEE, May 27, 1878.

EDITORS OF THE AMERICAN ARCHITECT:

THE Board of Public Works of this city has recently advertised for proposals to build a city hospital, which is intended to be used chiefly for cases of small-pox and other contagious diseases. The plans for this hospital were prepared under the instructions of a committee selected from the Common Council. As is usual with plans thus prepared, they are totally unfit for the purposes intended.

Dr. O. W. Wight, the Health Commissioner of the city, a gentleman of culture and ability, in a lecture delivered before the Popular Science Class, on Thursday evening last, drew attention to this miserable arrangement called "a plan for a hospital." The newspaper press has heartily supported the views of the Commissioner, and it now remains to be seen whether the buildings will be erected according to the present plan, or another be chosen, more in accordance with the intelligent ideas and methods in hospital matters seen elsewhere. Should this building be erected, it will be simply one more proof of the error which appoints committees from such bodies to control the plans for public buildings. Usually they have not sufficient knowledge to understand that they know nothing about it.

This plan is so bad that it can receive only condemnation. Every requisite for a building for hospital purposes is ignored. Fortunately the building is neither large nor expensive, the present cost being limited to $8,000. This amount nevertheless might as well be expended judiciously as otherwise. The action of the committee in this case is inexcusable. Sketches were prepared and submitted to the committee which combined all the requirements set forth by the best authorities upon hospital building. The pavilion plan was of course the basis, but the sketches showed a variety of methods in the arrangement of administration buildings, pavilions, etc., of both one and two story pavilions. These sketches were, as they should be, extremely plain and simple in an architectural point of view; but our wiseacres could see no further into their merits than a resemblance to a "lot of barracks," while their classic souls aspired to an imposing building. The aspiration met its satisfactory response in a Greek cross, and a draughtsman was straightway engaged to draw it for them. In this cross the committee behold with delight every hospital requirement according to its ideas, from the administration building to the small-pox ward, — the sewage of the building emptying into a dry well outside. It is very likely if the room could have been made for that dry well inside the building there it would have been. Eight acres of ground are to be devoted to this hospital; therefore it will be seen that this crowding was imperative.

*

[WE give place to this communication on its own merits, not knowing anything of the plan in question except what the communication tells us. On the general principle involved we agree with the writer: for to plan a hospital properly, even a simple one, is a matter of special skill and knowledge, and it is a hazardous thing for anybody to attempt who has not acquired these by special study. The only two points in the plan that are described seem to be rightly criticised. Absolute isolation of contagious wards is one of the first principles of hospital planning; and to drain such a ward, or indeed any ward, into a dry cesspool is a blunder which in the present state of sanitary science is at least unnecessary. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

LIGHTNING CONDUCTORS AND EARTH-CONTACT. — The importance of a perfect earth-contact for lightning conductors is shown by an accident at Nottingham, in 1868, which is mentioned by Dr. R. G. Mann in the *Journal of the Society of Arts*. A copper lightning conductor four tenths of an inch in diameter was attached to the weathercock, one hundred and fifty feet from the ground, upon the spire of a new church, and was carried in an unbroken line to the ground, and probably at first had a good earth-contact; but after the accident an investigation showed that some thief had drawn it out of the ground and carried away all that was more than six inches below the surface. On October 16, 1868, the church was struck by lightning, the fluid passing quietly until within about six feet of the ground. Had there been a good earth contact, all would have gone well, but at this point it was drawn from the conductor to a gas-pipe on the inside of the wall, although separated from it by four and one half feet of solid masonry. The lightning then passed along the pipes to the gas-mains and off into moist ground; but on its passage it totally destroyed a short piece of pipe near the gas-meter and allowed the gas to escape, which, by the way, caused another accident on the following day, when a lighted lamp was carried into the cellar by the person sent to look up the leak. At the point where the electric fluid passed through the wall from the conductor to the gas-pipe, the stone work was splintered into fragments through an area of about a square yard on either face of the wall, while the centre of the wall for a thickness of about a foot was entirely uninjured.

A WHISPERING GALLERY. — The old round-house at Worcester, now being torn down, possessed the same peculiarities of transmitting sound around its walls that makes the whispering gallery at St. Paul's such an attraction to travellers.

Women as Artists.—The numerous societies of decorative art, conducted and supported by ladies, that have come into being since the Centennial Exhibition, might lead people to suppose that in this country, at least, women had never done anything practical in the way of works of fine art. Laying out of the question instances of individual prowess in this direction, there have been in existence for some time schools of greater or less extent and completeness of organization as at Cincinnati and Boston, and particularly at New York, as one of the departments of the Cooper Union. Here under the direction of Mrs. Susan N. Carter, drawing and painting are taught in their various branches, and in such a way as to enable the pupils to profit immediately by their skill; for it is stated that during the past six months the ladies of this department have realized $11,000 by the sale of their work and by the salaries they receive as drawing-teachers. As we find that there are one hundred and twenty-six pupils the average monthly gain per pupil was about $14.50, which is far from a poor average for off-time work. It would be interesting to know whether the products of the school were sold on their own merits as works of art, or as the work of ladies. But it would still be difficult to determine how much gain was due to the compassionate purchaser who wishes to encourage female enterprise, or how much loss was due to the unscrupulous dealer who systematically underpays because it is a woman's work that he is purchasing.

Millions in it.—Perhaps the smallest foundation for bringing a civil suit for damages is that which Carl Pietsch urges against Henry Soeffer of Brooklyn in a suit for $500 damages, because the defendant has built on the plaintiff's land to the extent of two inches at the surface, the encroachment increasing to six inches at the foot of the foundation wall. If the plaintiff gains his suit it will be for the advantage of impecunious landholders to examine their title deeds with the expectation of finding a similar chance to turn an honest penny.

The Mississippi Jetties.—A despatch from Washington says that the bill introduced in the Senate May 16 by Mr. Windom, amendatory of the act approved March 3, 1875, authorizing James B. Eads and his associates to create and maintain a wide and deep channel between the South Pass of the Mississippi River and the Gulf of Mexico, provided that when a channel shall have been obtained by the action of the jetties and auxiliary works authorized by said act—24 feet in depth and not less than 150 feet in width—there shall be paid $750,000; provided said channel shall then be 200 feet wide by not less than 22 feet deep. When 25 feet in depth, and not less than 150 feet in width, $750,000; provided the channel shall then be 250 feet wide by not less than 22 feet deep. When 26 feet in depth, and not less than 150 feet in width, $500,000; provided the channel shall then be 300 feet wide by not less than 22 feet deep. When 27 feet in depth, and not less than 100 feet in width, $375,000; provided the channel shall then be 200 feet wide by not less than 24 feet deep. When 28 feet in depth, and not less than 100 feet in width, $375,000; provided the channel shall then be 250 feet wide by not less than 24 feet deep. When 29 feet in depth, and not less than 100 feet in width, $250,000; provided the channel shall then be 250 feet wide by not less than 24 feet deep. When 30 feet in depth, and not less than 100 feet in width, $250,000; provided the channel shall then be 200 feet wide by not less than 26 feet deep. The bill requires that the remaining $1,000,000 of the compensation provided in the act of 1875 shall be due and payable from time to time as therein set forth, when the maximum channel described in this amendment shall have been obtained.

The Welland Canal.—Canada is proposing to spend $30,200,000 in enlarging the Welland canal,—which, some thirty-five miles in length, connects lakes Erie and Ontario,—and in removing obstructions in the St. Lawrence River. This is to be done with the hope of drawing Western trade into Canada and away from the United States. Already contracts to the amount of $12,860,000 have been concluded, and it is probable that this important step toward making Canada a really prosperous country will be carried through with energy. Lobbyists and others are making of this fact a handle to urge an increase of the appropriation for the improvement of Harlem River.

Archæological Discoveries in Rome.—The discoveries which have been made by the Roman Municipal Society have of late been very numerous. During the past year statues of Silenus, Melpomene, and Mercury have been discovered; also busts of Faustina and of Flavia Maximia Fausta, wife of Constantine, together with many bas-reliefs. More lately have been discovered in the Via Santa Gregorio, at a depth of thirty feet, fragments of a frieze some twenty feet long, which bore on it life-size figures in high relief. At the same place were found pieces of an equestrian statue in bronze gilt. In the cemetery of Santa Lorenzo three marble substructures have been unearthed: one a child in the attitude of a discobolus, another a child with a dove, while the third is headless. The most important finds seem to have been made at the Palatine, between the House of Augustus, which is yet to be explored, and the buildings built by Septimius Severus. Here were found many architectural fragments, such as drums of columns in red and black granite and marble capitals, bases and fragments of cornices; but besides these several statues were found, of which the most beautiful is a female figure of heroic size, but without head or arms. This statue, which is thought to be of the time of Hadrian, is said to be of more than ordinary excellence, and is thought to represent an empress. Perhaps the discovery that has awakened most archæological fervor is the finding of the pedestal on which rested the statue of Cornelia, the mother of the Gracchi, which Pliny mentions as standing in his day. It was not destroyed at the time of the burning of the Portico of Octavia, A. D. 80, but stood until the days of the *prefecti urbi* of the Lower Empire, as is proven by the mark, still to be seen on the pedestal, which at that time was usually affixed to the works of art then existing in the city. With such particulars before one it is easy to believe the statement that works of art are now discovered so rapidly in Rome that there are not places enough to put them in, and that they are perforce stowed away in cellars and storehouses, where at some future day they may have another resurrection.

Educational Voyages.—We believe we are right in saying that the Woodruff Expedition, which presented itself to the public with such an attractive programme, an account of which will be found on page 214, vol. ii., has been indefinitely postponed, if indeed it has not been definitely abandoned by its projectors. A similar expedition is however, likely to take place, this time under French auspices. The Picardie, a vessel of 1,560 tons and having engines of one thousand horse-power, has been obtained by the Société des Voyages autour du Monde, and is advertised to sail from Marseilles on the last day of the present month on an educational voyage around the world. The details of the scheme we are ignorant of, but its general purport is the same as that of its American prototype.

Cemeteries in Europe.—The story goes that a Frenchman who had lost his wife ordered a stone-cutter to make him a suitable tomb-stone and on it cut the single word *regrets*. The stone-cutter respectfully hinted that *regrets eternels* would be a more appropriate inscription. "Alas, no, sir!" said the gentleman. "I have hired the grave for five years only." The story may very probably be a true one, for it is a common practice in several European countries to hire graves for a term of years and renew the lease when the first one expires, if the friends of the dead have the money, or the loving respect that would keep their remains undisturbed; but if there are no means of renewing the lease, or if the relatives are forgetful, or the family extinct, the remains are taken up and buried again in a common trench, or relegated to a catacomb, as the case may be. In some of the burial grounds of Paris the condition of things is really frightful. Here the ground has been used over and over again till it has lost not only all its original antiseptic properties but has become a distinct source of corruption. It is no uncommon thing for the grave-diggers whose unpleasant duty it is to exhume the bodies which have been buried for a longer or shorter period to be asphyxiated by the gases arising from the graves they are opening, and it has been more than once suggested to the municipal council of the city that these men be furnished with pure air while at their ghoulish work, by the same kind of apparatus that serves for submarine divers.

A Gas Consumers' Strike.—Gas-monopolists in this country have had their pretensions restrained in many different ways, but we cannot remember a case quite parallel to the treatment to which the gas companies at Barcelona, in Spain, have been lately subjected. It seems that the various gas companies have assessed a municipal tax on the consumers. The payment of this tax became so irksome that by concerted action no gas was burned by the inhabitants during forty-three nights. The city officials tried to compel the shop-keepers who were closing their shops at sundown to keep their shops open, and a proclamation was issued to this effect. The Minister of the Interior supports the action of the city authorities, and this has given the opposition a text for making an active demonstration against the Government, and at one time there seemed to be every chance that at some time in the future a Spanish republic might celebrate the blowing up of a gasometer as we Americans do the tea-making in Boston Harbor.

The Hot-Water Well at Pesth.—One of the curious features about the hot-water artesian well at Pesth, in Hungary, which we have described (see page 8, note), is the adaptation to it of automatic machinery for boring, the water power for which is supplied by the well itself. By this means the boring has been conducted at double its previous rate. The notion is entertained that the abundant supply of warm water may be used in cultivating tropical plants in the gardens of the neighborhood.

Pews.—The first seats provided in churches are seen in some Anglo-Saxon and Norman edifices still standing in England. They consist of stone benches which project from the wall around the whole interior excepting on the east end. In 1319 the congregations are represented as sitting on the ground or standing, and it was at this period that the people introduced low, rude, three-legged stools promiscuously over the church. Not until after the Norman conquest were wooden seats brought into use. In 1287 a decree was issued, in regard to the wrangling for seats (which had become a decided nuisance), that no one should call any seat in the church his own except noblemen and patrons, each person taking the nearest empty seat he could find, as he entered the church. From 1530 to 1540, as we approach nearer to the Reformation, seats were more generally appropriated, their entrance being guarded by cross-bars, and the initial letters of their owners engraved upon them. But directly after the Reformation the pew system commenced, for there is extant a complaint from the poor commons addressed to Henry VIII. in 1546 referring to his decree that a Bible should be in every church at liberty for all to read, because they feared it might be taken into the "guyre" or some "pue." Galleries in churches were not known until 1608. As early as 1611 luxurious arrangements were considered essential in church pews, and they were haized or cushioned all over their sides, and the seats furnished with comfortable cushions, while foot-stools were also introduced. Next, the sides of the pews were made so high that they entirely concealed the occupants from view. This is said to have been a device of those who desired not to be seen by the officers, who reported all who did not stand up and bow low when the name of Jesus was spoken by the clergyman. Fire-places [?] were also built in the pews, and every possible convenience added for the comfort of the highly-favored few. But the services were often so long and tedious that the listeners fell asleep and frequently nodded their approbation of the minister's sermons, while they were totally oblivious of its teachings. Swift's lines, which we quote, allude to the prevailing fashion of church upholstery:—

> "A bedstead of the antique mode,
> Compact of timber many a load,
> Such as our ancestors did use,
> Was metamorphosed into pews,
> Which still their ancient nature keep,
> By lodging folks disposed to sleep."

With the reign of Charles I. the reasons for the heightening of the sides of the pews disappeared; and from the civil war they declined to their present height.—*Springfield Republican.*

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The Commission on the Congressional Library, appointed some time ago, has, it is said, prepared a report which will be presented to Congress immediately. If we may judge by the accounts of it which have been made public in advance, the report is a very judicious one. A number of propositions, it will be remembered, were submitted to the Commission. Opinions were divided, in the first place, between an extension of the central part of the Capitol and a new building. For the new building a variety of sites was proposed. One was on new ground to be purchased on Capitol Hill; another was in Judiciary Square, — a reservation north of Pennsylvania Avenue, now left vacant by the removal of the District jail, — another on the avenue itself, opposite the Botanical Garden. The Commission rejects the proposal to extend the Capitol for the accommodation of the library, saying that it will be impossible to permanently provide for the library by this means; and in answer to the objection that a separate building will take the books out of reach of easy consultation by Congressmen, proposes to retain within the Capitol a working library of from fifty to seventy thousand volumes, which, as Mr. Spofford maintains (who as librarian is a member of the Commission), is twice as large as any parliamentary library now in use. The purchase of ground on Capitol Hill, where the Government has no reservation except that which is occupied by the Capitol itself, is rejected because, as things move, it would probably make a delay of two years, and there is need of immediate provision. The choice of the Commission is therefore Judiciary Square, and their report recommends an immediate appropriation of $150,000, to begin work with. It recommends also that the Commission be continued, and empowered to procure and present to Congress plans for a new building, which they would set in the centre of the square so as to give it room to grow in all directions.

There can hardly be a doubt that the Commission has done well in refusing to indorse the extension of the Capitol for the use of the library. Our reasons for thinking so are implied in what we have said before (*American Architect*, March 16, 1878) on this subject. The choice of Judiciary Square seems on the whole the best that could be made. Capitol Hill is too remote from everything but the Capitol, and there is probably no place on Pennsylvania Avenue, unless it is the place at Seventh Street, where the new market has been lately built, in which a great public building could be set without ultimate injury both to itself and the avenue. A library is a building which, though it should be accessible, is most at home away from a great business thoroughfare; and for the sake of security, light, and air, it should be as widely as possible separated from other buildings. It needs isolation and quiet, in fact, almost as much as a hospital. In Judiciary Square it would be as effectively placed as anywhere that we think of, and at once isolated and accessible. The library of Congress really serves, and ought to serve, two purposes: it is a library of reference for Congressmen and of study for scholars from all parts of the country. Both these uses are important, though with all respect to our legislators we think that the second is or will be the more important. Fortunately the two uses may be to a great degree independent of each other, as is provided for in Mr. Spofford's plan of dividing the books. For the general uses of the collection, as much as for its security, it is better that it should be removed from the Capitol, while its growth makes this imperative. Its greatest foe, we suspect, will really be the paternal fondness with which Congress has provided for its growth. The regulation which means it with two copies of everything that is copyrighted in the United States is in the long run appalling, and must ultimately produce a dropsy which can only be remedied by the knife. No design for architectural expansion can permanently keep pace with it. Unless this oppressive order for preserving in honor all the worthless literature of the country can be modified, we would venture to suggest that the Commissioners, if they are empowered to construct a building, should build it in two sections, one inflammable and one fire proof, and that the librarian should divide his collection accordingly.

The agitation of the laboring men does not diminish, and, although we hear less of communists drilling and arming all over the country, the socialist organizations are kept in vigorous action, and meetings compounded in different proportions of workingmen and communists are as abundant as ever. It is true that these names, "communist" and "socialist" and many others, mean different things to those who claim them, and that among those who are thus commonly classed together are men of very different aims. But a general view shows such continuous gradations from the red anarchist at the one end, to the honest workingman on strike at the other, that there seem to be no points at which they can be marked off into classes. We notice, too, in the reports of workingmen's meetings a pretty steady infiltration into their platforms and speeches of the ideas of socialists, such as, for instance, that capital is the product of labor, by which is meant merely manual labor, and should therefore be its reward; and that it is the business of government to provide for the support of the working population. At a late meeting in Washington it was argued that capital was only overwork, and that if a man worked for two dollars a day he earned that in the first six hours, the balance of the time being the capital of the firm. It is an easy step from this to the claim, which we have heard before, that it is the workingmen who pay the taxes. Accordingly we learn from a meeting in Louisville, after being told that the laborer is worthy of his hire, and also is worthy of being hired — which does not rest on the same high authority — that "after all, the laborers and producers who work for small pay and cancel their just debts are the class upon which the great burdens of taxation, public defence, and general improvement fall." So in a meeting at Fall River, Mass., the resolutions demanded "an immediate return of the fifteen per cent [cut off by the employers], whether they are making a profit or not;" a resolution which was clinched by another that puts the Fall River magnates in a position of greater influence than they would probably claim for themselves, declaring that "The Fall River Manufacturing Board of Trade, through their influence in New England, in reducing wages, and encouraging an eleven and twelve hour system by their violation of the ten-hour law, are responsible for the present labor troubles, which are the direct result of New England cheap labor." It appears, nevertheless, and is a wholesome symptom, taken for what it is worth, that the workingmen are coming more or less to regard the name of communist as a reproach. We even find them occasionally flinging it back at their oppressors and declaring that the capitalists are the communists of the country.

Meanwhile the Senate Committee on Education and Labor has reported against the resolve for enforcing the eight-hour law, saying that the purpose of the law is simply to limit the hours of work to eight, without meddling with their compensation, and they add that, —

"It is clear that the Government should employ its workingmen at the same rate as is paid for like labor outside of government establishments in the same locality. A system under which it would pay higher wages than private concerns pay for like work would result in establishing favoritism in labor, which would very naturally be offensive to all men outside government employ, and would ultimately lead to the abandonment of the

government workshops. It is well known that in these workshops men are often employed upon the recommendation of members of Congress, not always with reference to their qualifications. This system, of itself, is sufficiently distasteful to the workingmen outside of the government establishments, and any regulation of law giving to these government employees the same wages for eight hours work which the same class of workmen outside get for ten hours work, would make it still more distasteful."

It is from Baltimore that that story of the latest building accident comes; and it looks like a *reductio ad absurdum* of the attempt to build with the minimum of material. A three-story brick house, which is described by one of the local papers, with perhaps unconscious irony, as a fine brick dwelling, had just been so far finished that the roof was going on, when it fell without warning and buried eight men in its ruins. One of these, the master bricklayer in charge of the building, died on his way home, three others are thought to be dangerously injured, and the rest were more or less seriously hurt. It appears that the house, which was exposed on one side, the adjoining lot not being occupied, had on that side only a four inch party wall. This wall, which was not even stayed or tied in its whole height, bowed under the weight upon it and brought the rest of the house with it into the cellar. We are assured that it is a not uncommon habit in Baltimore to build in this astonishing way. The chapter of the Institute there has been hard at work for two years to get passed a proper building law; but has thus far been defeated by the opposition of builders. It may be hoped that with this illustration before them the people of that city, who seem as unwilling as most people are to learn from the experience of others, may be led to see the error of their ways, and be brought into some agreement with the rest of the world as to their need to protect their citizens' lives against the recklessness of incompetent or unscrupulous builders. An unlucky custom of the city is said to be in the way of a proper inquiry into the case. It is a disadvantage which is common to most cities that at least one man must be killed in order to provoke a serious inquiry; but in Baltimore it is the rule that the inquiry should be held by the coroner of the district in which the man dies. The master bricklayer in this case lived in a suburban town and died just outside the city limits, and the question occurs whether the death of one of the other injured men will not be necessary before the Baltimoreans can gather due fruit from their disaster. It is to be hoped that they may dispense with this condition; such accidents are too full of instruction and too costly to be wasted.

Simultaneously we hear of the fall of a county bridge in Indiana between the manufacturing towns of Aurora and Rising Sun. Happily, anticipating both godparents it fell at two o'clock in the morning, and so avoided injuring any body. Built nine years ago by the adjoining counties at a cost of $45,000, it was, says the *Cincinnati Gazette*, "a combination of wood and iron, after what was then a new and untried pattern, and since its completion has always been considered unsafe by those who have had much experience in bridge-building." What the "pattern" was we have nowhere seen set forth. But every bridge that falls makes one wonder — and such testimony as we heard at the Ashtabula and Tariffville inquests makes the wonder grow — why people do not realize that the building of a good bridge in modern ways is a difficult feat of engineering, and that, however safe it may be to repeat what has been approved by experience, the introduction of new and untried patterns is only to be allowed to engineers who have qualified themselves by very thorough training to see exactly what they are doing.

The promising success of the elevated railroads in New York has stimulated the authorities of Brooklyn to take advantage of the Act of the New York Legislature of 1875, which empowers each city to appoint commissioners with authority to report whether steam railways across its territory are necessary or desirable, and if so to propose the routes on which they shall be built. The commissioners, appointed in March, have just rendered their report, in accordance with the provision of the Act which required them to decide upon the necessity of the transit in one month, and in case they considered it desirable, to report a plan of routes for it in two months. They promptly decided that the city imperatively needed rapid transit, which in the language of the day seems to mean railways in the air, and advertising for plans and suggestions of routes, have, they say, heard all those who chose to offer advice or plans. The problem of transit for Brooklyn, spread as the city is over the broad end of Long Island, is much less simple than for New York, which practically defeats the geometer's definition of surface by having its extension in only one direction. The commissioners naturally take the terminus of the East River bridge for what the Germans succinctly call their *knotenpunkt*. They have attacked their problem with vigor, with the conviction that a system of sixty miles of elevated road, covering pretty much all their thoroughfares, will ultimately be necessary, but limiting themselves for the present to about a third of this, providing for a semicircle of five miles radius about the end of the bridge. Within this they lay out lines diverging from their centre, of which the chief ones will occupy Fulton street from the ferry to the outer line of the city, and Washington street, with the whole of Myrtle Avenue to Broadway. Various branches diverge from these, and a cross line connects them. The people of Brooklyn are not alive to the real import of rapid transit, say the commissioners, and the report urges them to prompt action. It is hardly likely that such a scheme as that of the commission will be adopted without considerable discussion and resistance. People are not fond of delivering up their chief thoroughfares to be roofed over with steam railways; and in spite of the general convenience, and the fact that property is said to have lost nothing in value under the Sixth Avenue route in New York, it is not to be expected that the people over whose heads the transit is to be made will accept it with a very good grace. Myrtle Avenue, over which one of the main lines is to be carried, according to the new plan, was once before proposed for such a use, but the opposition was so strenuous that the city authorities forbade it. A single line of rails in a city is apt to prove a bitter apple of discord; but the Brooklyn commission has thrown out a whole basketful.

There is instruction for contractors — or for their bondsmen — in the experience of Mr. Mullins of Brooklyn: if the Schleicher bill should be passed by Congress, the lesson ought not to be lost on the hundreds of builders who will rush to offer doubtful bids on the buildings which it will put upon the market; for the lesson is the same although Mr. Mullins's tenders were for beef and mutton instead of for labor or building materials. The Board of Supervisors for King's County advertised for supplies for the public institutions of the county, requiring that each bid should be guaranteed by two bondsmen. Mr. Mullins put in his bid with proper sureties, and then attempted to withdraw it. The Supervisors, however, insisted on awarding him the unwelcome contract, and when he refused to perform it, they sued his bondsmen, against whom the city court has rendered judgment for some three hundred dollars. There are few greater annoyances in the administration of government work than the intrusion of insincere bids into competitions. If the system of letting public buildings by definite contract is to prevail, there will be a great deal of such annoyance, to which the Government is more exposed than private persons, both by reason of the greater importance and attractiveness of its contracts, and because it has less liberty of discrimination than private persons. It is therefore to be desired that such adventures as that of Mr. Mullins and his bondsmen, and the late quarrel of Mr. Martin with the Albany State House commissioners should be as widely known as possible, by way of caution to bondsmen, of warning to straw bidders, and as admonition to those who are charged with the letting out of public work.

THE CUSTODY OF AN ARCHITECT'S DRAWINGS.

The communication on Sir Edmund Becket's book upon architects, which appeared in our paper some weeks ago, suggested one or two questions of architectural practice in such a way that we have wondered whether none of our correspondents would allude to them. The remarks we had occasion to make on Mr. Schleicher's bill the other day again brought up one of these, that is, the question to whom should belong the custody of the drawings which an architect prepares for the convenient execution of his work. We call this a question, because it is sometimes so presented. As a matter of fact there is in actual practice no such question, the ordinary and recognized usage being uniform, — that the architect's drawings and records are not only in his keeping, but his property. This is the basis of the custom recorded in the schedule published by the American Institute of Architects, which prevails wherever the practice of

architecture is well established, either in Europe or America, that drawings, "as instruments of service, are the property of the architect;" simply speaking, they are the tools of his trade. There still lingers, however, in the minds of some people, and in outlying communities where all professional usages are more or less nascent, a notion that a client pays for his plans, and therefore has a right to them. Whether because cases which involve it have been rarely tested, or because the bench has been negligent in inquiring into the actual facts, this usage has been slow of recognition in the courts, and is therefore supported by experience rather than by judicial record. At all events, it has been overlooked enough to make it worth while to examine the reasons for it, of which a man so acute as Sir Edmund Becket is yet so ignorant or disregardful as to recommend the express stipulation that "the plans and documents relating to the work shall be the property of the client, and the architect shall make at his own expense all copies of them necessary for the conduct of the works."

Of the objection that the client pays for the plans and is therefore entitled to them, we may say, briefly: No doubt the client is entitled to what he pays for, and if the architect chooses to sell his drawings to him this does entitle him to them. But no architect thinks of doing this, though we fancy that some may really do it without intending, by making out their clients' bills "for plans and specifications." This is easily avoided by using the more natural and comprehensive formula, "for professional services." The plans and specifications indeed are merely clerical records, and the architect's real work lies behind them. Nor, as a matter of fact, is there one case in twenty, perhaps not one in a hundred, at least where architectural practice is established in orderly form, in which the plans do actually pass from architect to client.

This leads one to consider what the architect's essential work is. It is not to make plans and specifications for his client, unless in certain unusual cases, but to contrive certain buildings, structures, or perhaps decorations, for him, and to see that they are properly executed. The drawings are technical contrivances which the architect employs, first in assisting himself to determine with exactness just what the work shall be, and second in directing mechanics as to how it shall be done. They serve also, more or less, as indications to the client of what his work is to be, but they are far too elaborate to be made directly for this purpose, which is generally met by special sketches and descriptions of a general character. What are called the working drawings are the architect's tools for carrying on his work. It is for this purpose only that he has them prepared; with a view to this, he decides how many and of what kind they shall be, a thing which is no concern of the client, provided only that the right result is attained in the end. If he could devise another sure and more convenient means of getting at this result, he might make no working drawings at all, and his client would have no cause for complaint. Made as they are, the client does not commonly know of the existence of most of them, nor could he understand them if he saw them. There is no more reason, then, in the nature of things, why the architect should turn them over to him than that the physician should give up the records he makes of his cases, or the lawyer his briefs and notes, or the minister present his parish with the manuscripts of his sermons; and it is no more the custom.

This view of the architect's function is one that deserves to be specially insisted on, for obvious as it is when it is clearly stated, and borne out as it is in its consequences in actual practice, it is very apt to be overlooked. The fact that there is not one case in twenty where the architect gives up his original drawings, is not from a mere negligence of clients in asserting their rights, but the natural working out of a principle whose results everywhere assert themselves, though the principle itself is often overlooked.

When plans and drawings have served their primary purpose as tools which the architect uses for carrying out his work, the value which remains to them is as records of it. These records may be of use to settle questions and disputes, if any arise afterwards, concerning the character of the work or the incidents of its execution, or as means of study, if alterations become necessary, or of reproducing it if it is destroyed. For all these uses the public is better served on the whole by the rule that the drawings should remain in the keeping of the architect. In most cases they are safer so, and more accessible. Only the most sedulous client takes any care to preserve his drawings, even if he has insisted on being supplied with them. The architect who has been called on to alter another's work knows how impossible it usually is to find, when they are needed, the plans which the owner may have procured. When it comes to the working drawings prepared for work of any complexity, they are beyond the comprehension of any but an expert, and not only need the explanation of the architect who made them or of some other, before any testimony can be got from them, but are sure, if they are not in his possession, to meet the common fate of unintelligible rubbish. In point of fact experience shows that if drawings are to be of any use as records, the client is not a safe person to intrust them to, for they are difficult to take care of and are sure to go to ruin as soon the first interest of novelty of possession is worn off. Especially in case of disputes, which often come up between owner and builder after the work is finished, there is clearly an advantage in having the plans safe in the possession of the architect, who knows better than anybody else the history of the building, and has been from the beginning the mediator and arbiter between his client and the workman.

To the architect himself his drawings have a value altogether apart from that which they may have for anybody else. They are the diary of his practice, his professional autobiography. They record his experience, his development, his aspirations, his failures, and his successes. The more he has put his heart into his work,—the more labor he has bestowed upon it, and the more completely he has identified himself with it,—the more will these records be invaluable to him. To the client the result alone, the finished building, is of importance. To the architect the process by which it was designed and administered is an essential part of his life; the story of it is his personal history. If this be thought a sentimental interest, it is a serious one to him, and it has its practical side. The record of the difficulties he has studied and the problems he has solved is there. The results are set down for his future use more clearly than they can be held in his memory. The traditions of his practice are recorded there for the use of his draughtsmen and assistants. The drawings contain an accumulation of information for their guidance which it would be extremely laborious for him to supply without such aid, and a guaranty against error and misunderstanding of his instructions which he can ill dispense with. To take away from the architect, whose working staff is likely to be constantly changing, the plans for his buildings as fast as they were finished, would be to cripple the working of his office to a degree that outsiders would hardly conceive.

A collateral advantage which the architect may in justice claim from the custody of his drawings is a reasonable assurance against the purloining of his designs. To give up the drawings means very often to see his work reproduced, without acknowledgment and without compensation, by some one into whose hands they have passed, and for the benefit of another with whom he has not even communication. This is a real injustice, though it is one which the world takes lightly, and for which no remedy is provided. The fact that the second use of them does not involve the labor on his part that the first did cannot lessen their value for the second use, nor invalidate his claim to compensation, any more than in the case of a patented invention. We do not propose, however, to stray into a discussion of the question of architectural copyright. We shall simply assume that so far as the usual course of practice gives the architect an opportunity to protect himself against the use of his ideas and inventions by persons who give him no return for them, it is just and reasonable that he should do so. The unauthorized appropriation of his designs is one of the chief of the minor annoyances to which he is exposed. So far indeed as this is mere imitation by others of the work that is before their eyes, it is probably impracticable to find a remedy for it. In fact, we doubt if it is desirable, in the interest of the whole community, that it should be remedied, if it could be. It is better that the architect should be content to make in this way his unpaid contribution to the public store, for it is of such contributions that the general habit of design is formed, and in this way not only do styles grow, but the individual architect gets here and there as much in return as he gives. Still, although he may be willing to give his fellows at large the opportunity to avail of his example as they see it in his executed work, to expect him to turn over to individuals without compensation the appliances which he has contrived for his personal use in carrying out this work is a very different thing, and it is asking too much.

Nevertheless, the client may fairly ask to be supplied with

such a record of the design and construction of his work as shall tell him how it is built, and direct him in case he needs to have additions or alterations made to it, or enable him to have it reproduced in its essentials, if it should be destroyed. No architect will object to furnishing such copies of the most important drawings as are necessary for this use. It should be done, however, with the full understanding that it is because the client desires special information, not because he has in justice or in usage any claim of ownership in the original drawings. And when this makes any considerable amount of additional work it is fair that the architect should be paid the cost of making these copies, for they are no part of the service he is by usage bound to render. Moreover, the client should understand that they are for his own personal use only, and if he subsequently has occasion, or prefers, to consult a new architect for alterations in his building, which under ordinary conditions of comity he is not likely to do, it should be a point of honor to him not to put into his hands the drawings of his predecessor, so long as that predecessor is in a position to set a value upon his rights in them.

The case of public buildings is somewhat different from that of private ones. They are usually more costly and expected to last longer. The public also, as master of the individual, assumes a right to be more exacting than a personal client, and there is less likelihood in case of subsequent alteration that it will have the opportunity of consulting a second time with the original architect. It is therefore desirable that in the case of public buildings a government should preserve on file sufficient plans of its buildings, even though they are built by private architects: in our opinion this ought always to be done. But this does not imply, be it remembered, that the government any more than an individual client is the owner of the original designs, nor should it be forgotten that the compensation which is allowed the architect for public work is usually small enough to make the furnishing of such plans a burdensome addition to his labors.

HOUSE DRAINAGE AND WATER SERVICE.[1]

Mr. Bayles is the editor of *The Iron Age* and *The Metal Worker*, a position which has brought him into correspondence with plumbers throughout the country, and which has necessarily called his attention to the sanitary bearings of plumbing work. He has brought to its consideration more than ordinary intelligence and industry, and this book is the excellent result. It is confessedly not intended for the instruction of sanitary engineers, but he must be an accomplished engineer who can read its three hundred and fifty-one pages without adding to his store of information.

Practical plumbers, as well as "architects, builders, householders, and physicians interested in studying the mechanics of hygiene," to whom it is especially addressed, will find it a most valuable practical guide. We find here and there opinions in which we cannot fully concur, and omissions which we should have been glad to see supplied. At the same time, it is but simple justice to say that in the field which it is intended to occupy it has no rival. It is more practical, more sensible, and more trustworthy than the somewhat fantastic book of Mr. Hellyer, and it is of wider scope and better suited to American practice than Mr. Buchan's little manual.

Mr. Bayles cannot be said to be in any sense disrespectful to the profession of architecture, but he makes, and he need make, no apology for saying: "It is a fact which unfortunately does not admit of intelligent contradiction, that in the architectural practice of the time very little attention is paid to the laws of health." After alluding to the slight apparent difference between good and bad plumbing work, "usually so slight as to escape the notice of any but the trained expert," he reviews the various details of house plumbing, giving especial attention to the question of traps, concurring with all who have given attention to modern investigations on the subject in condemning the common water-seal trap as being in many ways objectionable, stating as follows the assertions on this subject of Dr. Andrew Fergus, president of the Faculty of Physicians and Surgeons at Glasgow: "He also asserted as the result of careful and intelligent observation that the usual method of depending upon water seals in traps allowed sewer gas to diffuse itself through a house 'by a process of soakage,' and that in from half an hour to two hours the foul gases of the sewer and house drain would have saturated a seal, and thenceforth be freely admitted into the house." "Water standing in the traps of unventilated waste-pipes is constantly absorbing more gas than it can hold. Long before the point of saturation is reached it begins to give off on one side the gases it takes in on the other. . . . . Every waste-pipe, *even when ventilated*, should have enough water passed through it daily completely to replace the seal in its trap. When the pipes are unventilated it should be done very often."

This is a clear statement of a well-known fact which is at last becoming recognized in our profession, and it suggests a serious question for the consideration not only of architects, but of householders as well. Even though we may by careful daily attention to all the traps keep them filled with reasonably fresh water, and so secure tolerable immunity from danger, *so long as the house is occupied*, we leave the house, its carpets, curtains, wall-papers, etc., subject to the constant presence of foul air from the sewer or drain during the months of its summer abandonment. We bring our children back from the country, with its open air life, and shut them up in the presence of these impregnated stuffs, to wonder a few days later that they seem to be worse rather than better for their summer outing.

Another point to which our author calls attention is that the ordinary S-trap, being of large diameter as compared with the amount of water which passes through it, is washed by only a sluggish flow, which is insufficient to carry over the bend the solid matters delivered into it. The grease of the kitchen sink and the faces of the water-closet lie festering in the trap until very considerably decomposed. While so lying they are adding their product of foul gases to that which passes through the seal from the drain. One important defect of many of the "improved" forms of trap Mr. Bayles seems not to have recognized; this is that where a large chamber is provided, as a security against emptying by suction, the velocity of the movement in this part of the channel is lessened, and the tendency to deposit grease and other matters is increased. This deposit goes on, until by its accumulation it reduces the water way to what is necessary to cause a cleansing flow. In this manner the old bottle-trap, the D-trap, and several of the patented traps, which depend for their only merit upon their capacity to hold a considerable volume of water, soon become in effect simple S-traps, — with more irregular channels than the simple pipe furnishes.

The chapter on Waste and Soil-Pipes is thoroughly practical, and merits the attention of all who have occasion to write plumbers' specifications. Indeed, it is the great merit of this book, from beginning to end, that it gives the architect specific information concerning technical points, and the details of construction in a simple form, with a well-considered arrangement, the like of which is not elsewhere to be found. Enough instances are cited of the fatal agency of imperfect plumbing and defective drainage to make us all shudder at the responsibility we assume in directing the construction of such works. He does not show that the average first-class work produces more serious illness and death than we are accustomed to; but he makes it clear that a great deal of the illness and death to which we are accustomed originates in drains which we are in the habit of regarding as perfectly good, and that it is entirely in the power of the architect to reduce the average death-rate very materially.

In the chapter on Water-Closets we find less to commend. This is the fault not so much of the author as of the subject. He founders, as we all do, against the stubborn fact that no water-closet with only the usual supply of water, has as yet been invented suitable for ordinary in-door use, which is free from grave defects. The badness is of very different degrees; but until something is devised possessing much more positive excellence than anything now in the market no writer can satisfy his public on this subject. Mr. Bayles would have come nearer to success had he given us Buchan's system of ventilating the iron receiver of the pan-closet by the use of two pipes instead of one, the second one bringing a supply of fresh air into the outlet pipe above the water-seal, to establish a circulation in the receiver. The single pipe occasionally used is a vent hole, not a ventilator.

The chapters on Service Pipes and Water Service and that on Tanks and Cisterns are sensible and good. Over one hundred pages are given to the Chemistry and Hydraulics of Plumbing. These are somewhat elementary in their character, but none the less welcome for that. There are chapters also on the sanitary care of premises and on the character and characteristics of the plumber, and a very long, suggestive chapter on Water Supply in Country Districts.

What interests us especially is Mr. Bayles's treatment of the question of draining country houses. Our readers may remember that in a lengthy discussion in these columns he stood out stoutly in favor of the use of the cesspool, and against the system of sub-soil irrigation as a means of sewage disposal, invented by the Rev. Henry Moule (the inventor of the earth-closet), and successfully introduced in this country some ten years ago. Further investigation seems to have modified his opinion, as the following quotation indicates: —

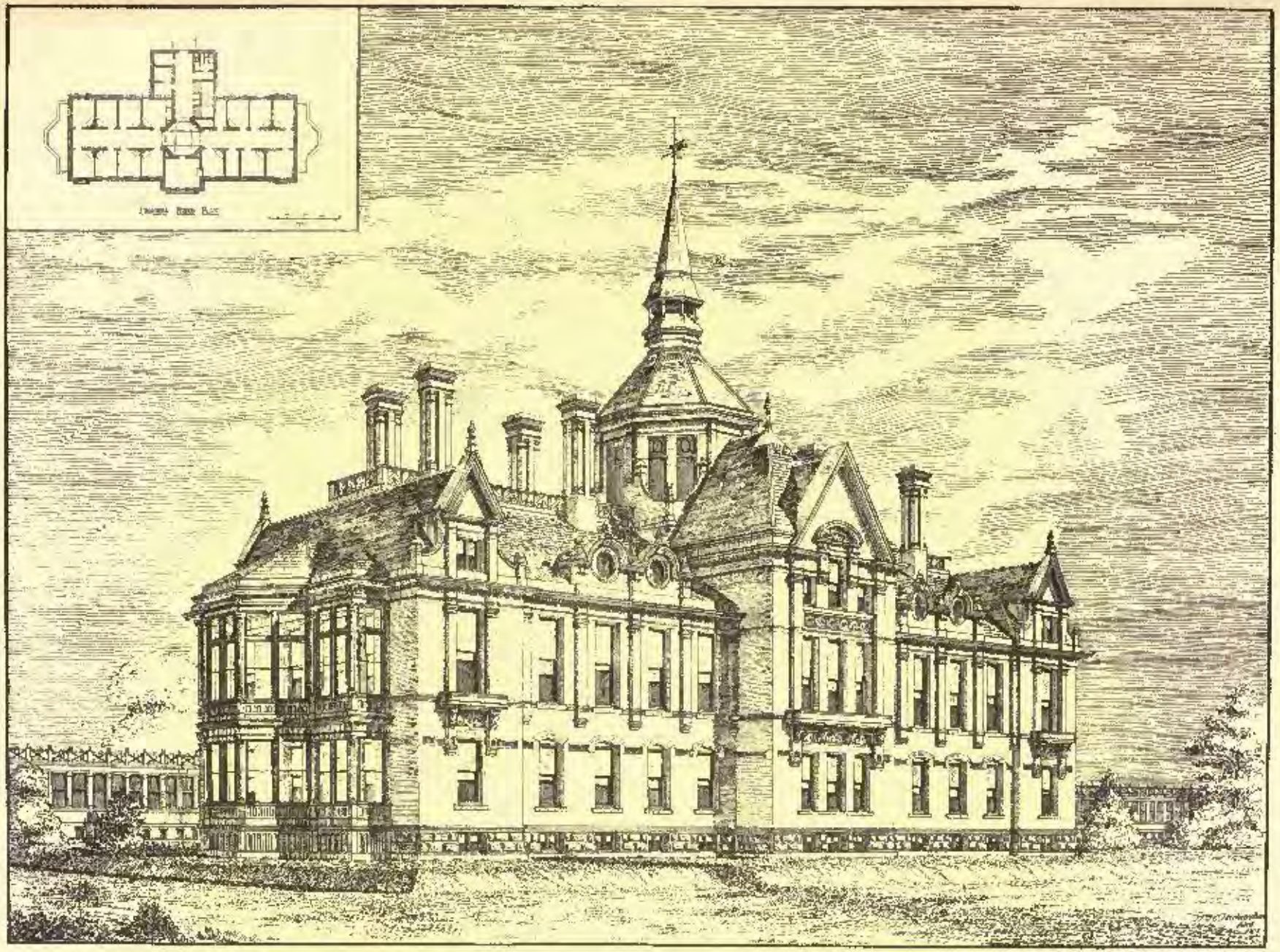
"I have no hesitation in expressing the opinion that under favorable conditions it will work satisfactorily, and be found an improvement on any other system which can be contained within the restricted limits of a village lot or villa site. There seems to be no reason why it should not work equally well on a larger scale, and in the case of Lenox I am informed that it does. English testimony is also strongly in its favor, and nowhere else has it been tested with equal thoroughness nor under so great a variety of conditions. When the conditions are unfavorable, or householders are unwilling to venture even so simple an experiment in sanitary engineering, I should recommend the tight, well-vented cesspool already described."

We venture the prediction that the foul-water earth filter, illustrated on page 286, will fall far short of sustaining the recommendation given to it; but there are very few of Mr. Bayles's suggestions concerning which we hold this opinion.

[1] House Drainage and Water Service in Cities, Villages, and Rural Neighborhoods; with Incidental Consideration of Causes affecting the Healthfulness of Dwellings. By James G. Bayles. New York: David Williams, 83 Nassau Street. Price $3.00.

American Architect and Building News June 5 1875.

No. 129



CABOT AND CHANDLER ARCH'TS
BOSTON

JOHNS HOPKINS HOSPITAL

PAY WARD

JOHN H. NIERNSEE CONSULTING ARCHT
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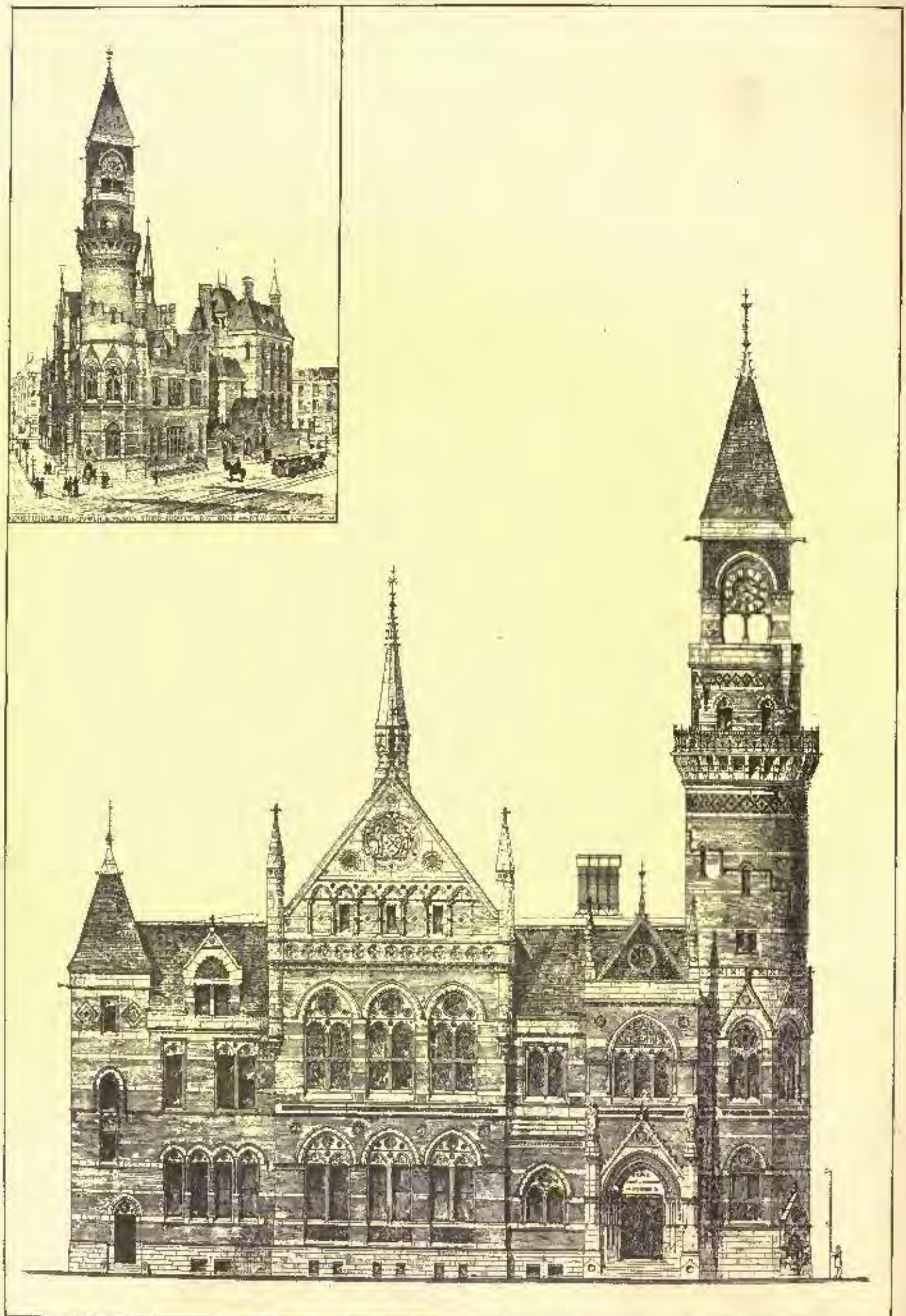

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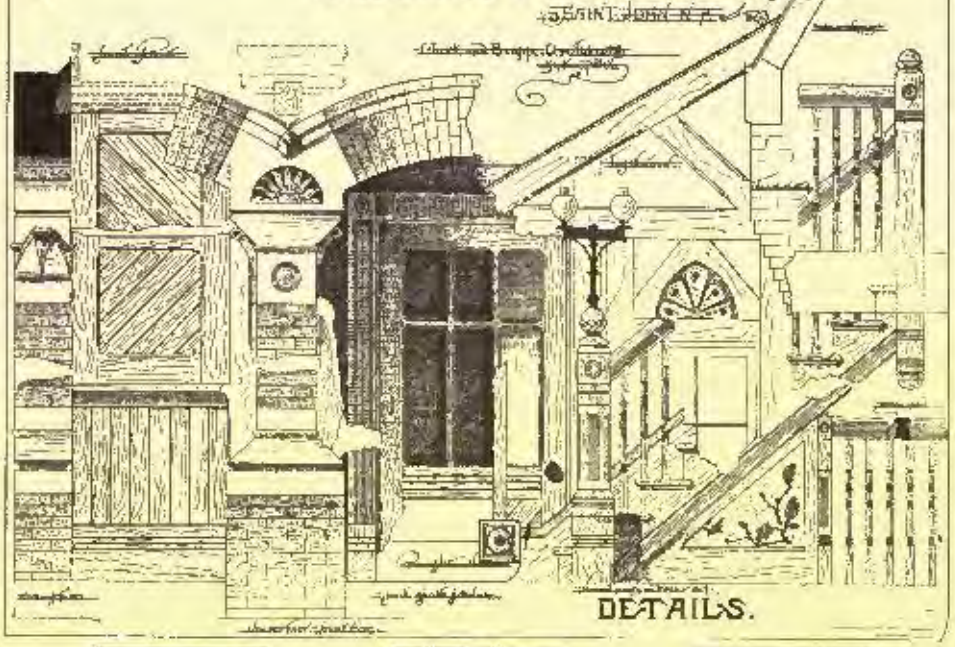
SIXTH AVENUE FRONT OF THE PROPOSED COURT-HOUSE FOR THE THIRD JUDICIAL DISTRICT OF THE CITY OF NEW YORK

CARSON FLOOD ESQ.



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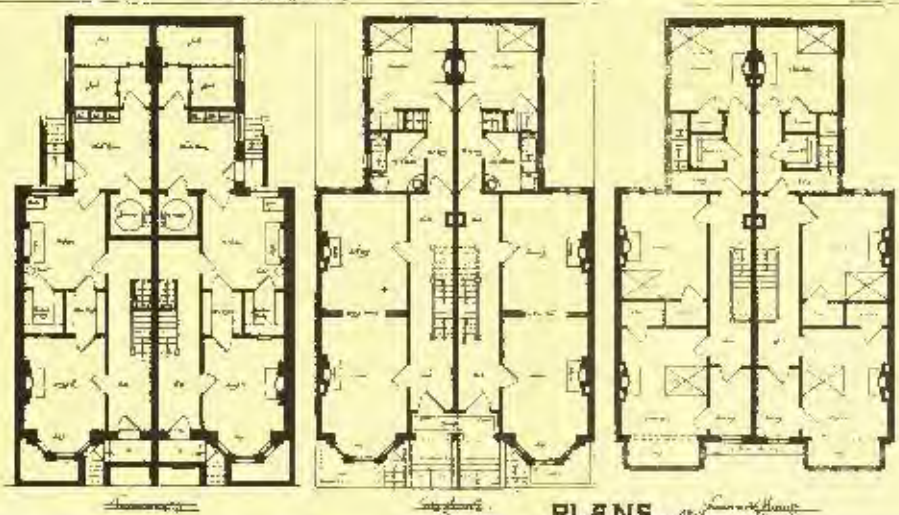

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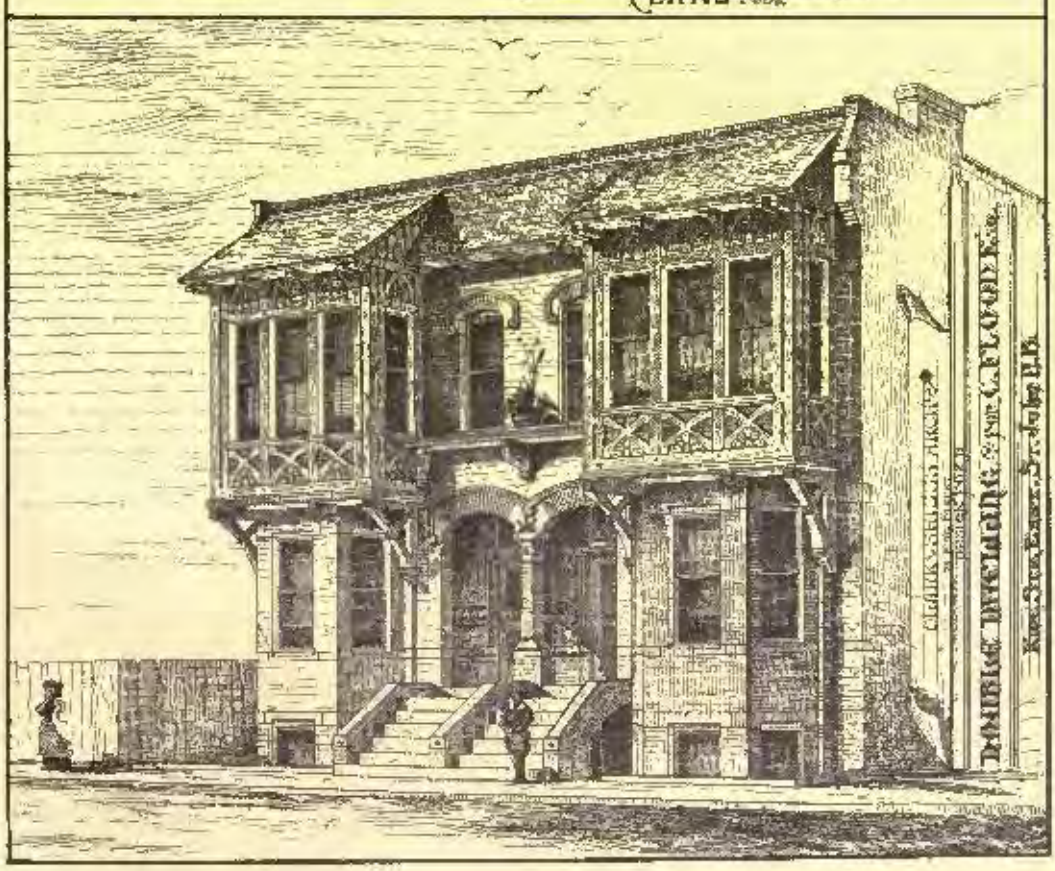
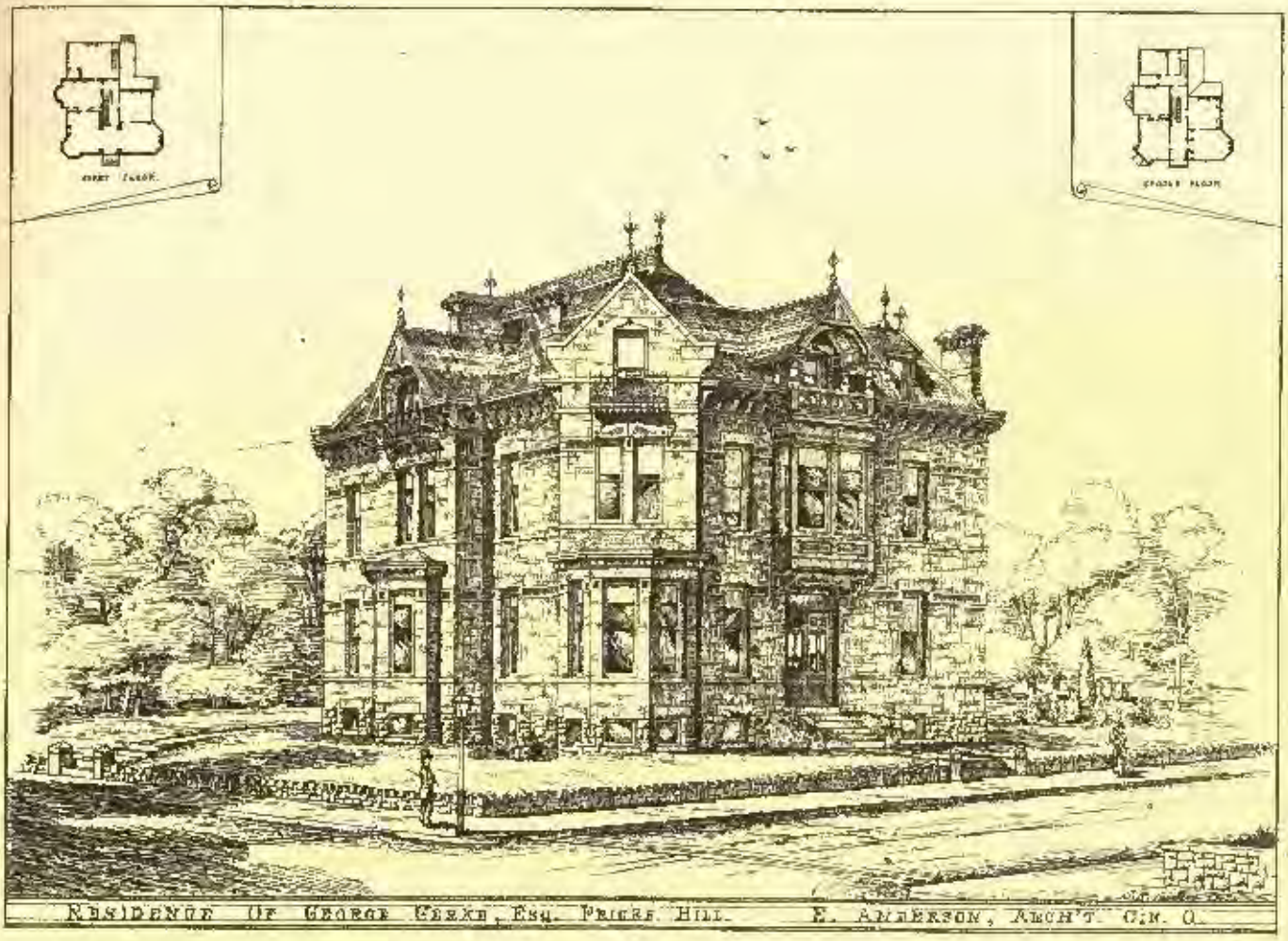
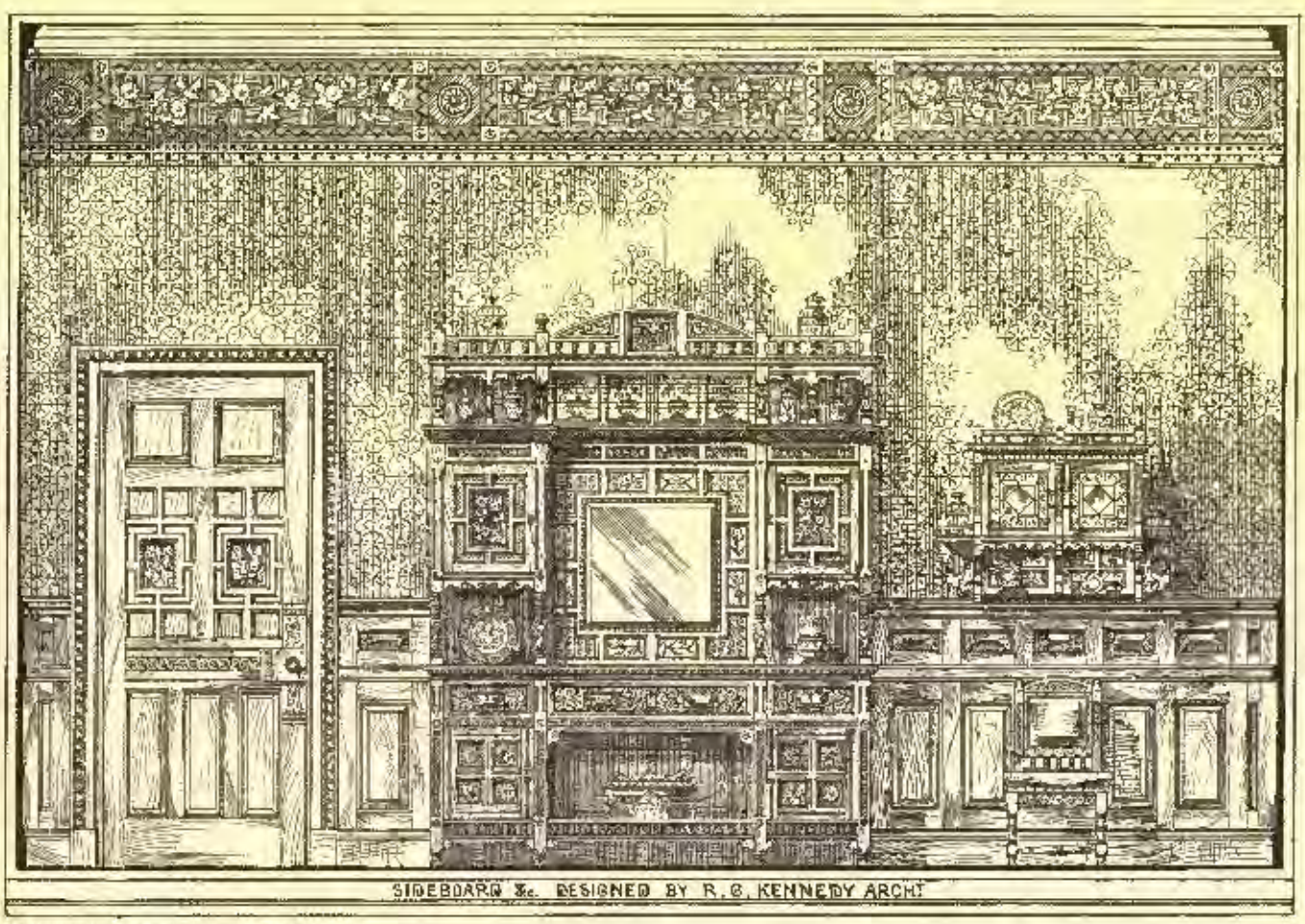




RESIDENCE OF GEORGE GERKE, ESQ. PRICES HILL. E. ANDERSON, ARCH'T. CIN. O.



SIDEBOARD &c. DESIGNED BY R. C. KENNEDY ARCH'T

THE HELIOTYPE PRINTING CO. 330 DEARBORN ST. BOSTON

THE ILLUSTRATIONS.

THE THIRD DISTRICT COURT-HOUSE, BELL TOWER, AND PRISON, NEW YORK. MESSRS. P. C. WITHERS AND C. VAUX, ARCHITECTS.

THESE buildings, commenced in 1874, were completed during the past year, and are located on a triangular plot of ground, formed by Sixth Avenue, Tenth Street, and Greenwich Avenue. The entrance to the court-house is on Sixth Avenue, through a large ornamental archway, into a porch 16 feet square, from thence on the left through a vestibule of the same size to the police court, and on the

right by a circular stone staircase to the civil court above; each of these rooms is about 61 feet by 37 feet. An examination room 37 feet by 24 feet, adjoins the police court, with a room for officers in charge of those awaiting trial, for whom separate rooms are provided in the prison building. The police magistrate's entrance is on Tenth Street, where offices for himself and his clerks are arranged. The rooms for the judge of the civil court are on the second floor adjoining the court room, with an entrance to them through the small tower on Sixth Avenue, in which is a staircase leading also to the rooms of the janitor on the third floor. The clerks of the civil court reach the offices provided for them by the principal staircase in the tower, and the third floor over these offices, and connected with them by a small turret staircase is a fire and burglar-proof room for the records of the court. The tower for the fire-bell is at the acute angle formed by the junction of Sixth Avenue and Tenth Street. The room for the look-out is reached by a separate, spiral stone staircase, with a private entrance from the street; the floor of this room is 98 feet from the sidewalk and above the ridges of all the surrounding roofs, so that an uninterrupted view of the neighborhood is obtained. Between the buildings occupied by the courts and the prison is an enclosed yard with an entrance into the latter, so that prisoners may be conveyed to and fro without publicity. The entrance to the prison is on Tenth Street, and leads directly from the porch into a guard-room 24 feet by 14 feet, adjoining which is a small bedroom for the keeper. On this floor are two large waiting or lodging rooms, for male and female prisoners. Accommodation in separate cells is provided on the second floor for 29 female prisoners, and on the floor above, and entirely separated, for 58 male prisoners. Each cell is 8 feet by 5½ feet and 9½ feet high. A steam elevator is arranged near the staircase to convey prisoners to their respective quarters, as well as to carry up the supplies from the kitchen which is in the basement. Rooms for the keepers are arranged at the entrance to the male and female prisons, and in connection with each; there are two larger cells for the detention of such persons as it may be considered advisable to separate from the ordinary class of prisoners. A small airing court 30 feet by 20 feet is provided in the roof, and reached only by the elevator, so that those prisoners who are detained any length of time may be able to take air and exercise without any possibility of escape.

The buildings are of brick, those of the court-house and bell tower being faced with Philadelphia brick, and those of the prison with Croton fronts. The stone used is from Berlin, Ohio, and its color contrasts well with the red brick. The carving, which forms an important element of the design, was done under the direction of Mr. William Simon. The interior walls of the main halls and staircase are lined with stone, with ornamental arches over the doorways, windows, etc., and enriched with a large amount of carved foliage. The interior of the court-rooms and offices are trimmed with black-walnut and cherry-wood wainscoting, doors, etc., and the floors of the vestibules and halls laid with ornamental tiles. The buildings are heated by steam throughout.

The total cost of the buildings, exclusive of architects' fees, amounts to rather less than $960,000.

HOUSE FOR G. GERKE, ESQ., CINCINNATI, O. MR. E. ANDERSON, ARCHITECT.

DESIGN FOR A DOUBLE DWELLING FOR CARSON FLOOD, ESQ. MESSRS. HENRY PASTON CLARK AND JOHN L. BRIGGS, ARCHITECTS, ST. JOHN, N. B.

The building is to be built on a lot having a frontage on King Street, East, of forty feet and a depth of one hundred feet. The main building will be thirty-eight feet in depth with an L of twenty-six feet in depth. The front will be laid up with Philadelphia face brick, with steps, belts, sills and skew-backs of Bulror freestone. The square bays are to be built of wood and painted a dark olive color. The slating of the roof will be of the New York red slate.

SIDEBOARD DESIGNED BY MR. R. G. KENNEDY, ARCHITECT, PHILADELPHIA.

JOHNS HOPKINS HOSPITAL, BALTIMORE, MD. MESSRS. CABOT AND CHANDLER, ARCHITECTS, BOSTON; MR. JOHN R. NIERNSÉE, CONSULTING ARCHITECT, BALTIMORE.

The perspective shows one of the two Pay-Wards which will be built of same material as the Administration Building, which was described in the *American Architect* of May 11.

CORRESPONDENCE.

ANOTHER CHAPTER IN THE HISTORY OF A REMARKABLE STRUCTURE. — ALLEGED CONSPIRACY AND FRAUD IN CONNECTION WITH CONTRACTS FOR STONE-CUTTING ON THE NEW CUSTOM HOUSE AND POST OFFICE.

CHICAGO.

THE Chicago Custom House and Post Office seems to be fruitful of more "investigations" than any other building of modern times. This time Wm. Henry Smith, Collector of Customs and disbursing agent, the fiduciary representative of the Secretary of the Treasury, has taken a hand in the business.

The history of this remarkable building and the "investigations" with which it is chronic have been pretty fully given in these pages. At the present writing the stonework, which is the only matter referred to in Collector Smith's inquiry, has all been set for seven months, with the exception of some exterior steps which are not even cut. The roof structure is up, and is now being tiled and slated. Contracts have just been let for the fire-proof filling between beams. Very little work is being done, for want of appropriations. The cost of land and building has thus far been $4,600,000. The land cost $1,200,000, leaving the amount thus far expended on the building $3,400,000. One million dollars judiciously expended would finish it. The amount already paid Mueller, the contractor for stone and cutting, is, for stock $615,425, for labor $1,261,606, for commissions $164,366, for sawing stone $124,381, for carting $37,899; total, $2,203,841. After this enormous expenditure and little or no work remaining to be done, it does not look as if there were much prospect of anything being saved. But the publicity hereby given to the results of the fifteen per cent contract system applied to stone-cutting will enable those not heretofore versed in the mysteries of government contracting to realize how the money goes in this department. It will be noted that the stone-cutting on this building is to the present time two thirds of its cost, and will be one half when it is completed. But this is only one of half a dozen government buildings still unfinished and of equal size, on all of which the fifteen per cent system prevailed until some time in 1877. Why it was not changed in this building is stated by Supervising Architect Hill in his reply to Mr. Smith: "For the reason that the work was reported to be nearly completed, and for the further reason that stone for most of that remaining to be done had been supplied, and had been more or less cut after the Potter designs;" that it would have been attended with great delay and expense, and perhaps a stoppage of the work; and that possibly the contractor and the Government could not have come to terms, for the contractor's voluntary assent was essential.

An outline of Collector Smith's report to the Secretary of the Treasury was given in the *American Architect* for June 1 (p. 189). The Collector's report consisted mainly of comments on a detailed report to him by H. W. Thompson, Assistant U. S. District Attorney at Chicago. The object in placing the matter in the hands of the District Attorney seems to have been to enable him to ascertain if sufficient evidence of collusion or fraud could be adduced to warrant bringing the matter before the grand jury. The main points in Mr. Thompson's report are: —

1. That the contract for stock, made September 2, 1872, was not made according to advertisement, an allowance of half an inch being made on finished schedule sizes, while the advertisement for bids stated that proposals would be received for neat sizes. This occurred under the administrations of Mr. A. B. Mullett as supervising architect, and J. C. Rankin as superintendent.

2. That the stone was not furnished of uniform color and quality as per agreement.

3. That the making of a fifteen per cent labor contract without competition set a premium on rascality. This was done by Mr. Mullett.

4. That "the entire payment on the sawing contract upon a proper construction was illegal." This seems to strike at Mr. Smith, as well as all the supervising architects and superintendents.

5. That the work was systematically delayed to stretch the job out and increase the commissions.

6. That all these things are evidences of collusion on the part of all the parties concerned, and that the whole matter should be laid before the grand jury.

In a supplementary report dated May 8th Mr. Thompson says that the supplemental contract for hauling the cut stone from the Twelfth Street yards to the building for the sum of fifteen cents per foot was illegal. This contract, according to Mr. Hill's statement, was negotiated by Mr. Potter, and signed by Mr. Hill a few days after he succeeded to the office of Supervising Architect on the 14th of August, 1876. All the other contracts with Mueller had been made by Mr. Mullett. The facts in relation to this cartage contract are, as nearly as can be ascertained, as follows: The stock contract of September 2, 1872, required that all the stone should be delivered at the building site. This was done for two years or more, and the work was cut in sheds built around the building. These occupying more room than could be spared, Mr. Rankin, then Superintendent, ordered Mueller to find some other place to cut the stone. He accordingly fitted up the yard at Twelfth Street, in which a switch was run by the Illinois Central Railroad Company over whose track the stone was brought from Buena Vista, on the Ohio River. He must have been working there and carting the stone to the building two years before anything was said about a supplementary contract. Mr. Hill gives the history of this contract in his reply to Mr. Smith. He says: "The subject of this contract has been several times presented to the Department by the contractor, but was rejected without consideration, on the ground that the cutting contract was supplemental to the stock contract, and that the two must be construed as a single instrument; under which construction it was held that the contractor was bound to deliver the cut stone at the site of the building." Mr. Hill then quotes from an opinion given by the Attorney General of the United States in January 1876, upon the request of the Treasury Department, which Mr. Thompson does not seem to have heard of. This opinion is to the effect that the "two contracts are not merged into one by the fact that Mueller is contractor in both." Consequently the delivery of the stone at the place when cut became a fulfilment of the contract for stock. When he dumped it in his yard to be cut he delivered it to the Government to be cut by the other Mueller, whoever he might be. Consequently, after considerable negotiation between Mr. Potter and Mr. Mueller, and a great deal of consultation with the Secretary of the Treasury and Solicitor of the Treasury, the contract was got ready just about the time that Mr. Potter resigned, and was signed by his successor, Mr. Hill. The point made by Mr. Thompson, that no deduction has been made from Mueller's contract to deliver rough stone at the building, on account of its delivery at the railroad switch, seems to be well taken, according to the precedents of architectural practice. Mr. Thompson also avers that the first payment of $27,000 for cartage was made before the contract was signed, but Mr. Hill shows that this could not have been so. The voucher, however, was all ready in anticipation of the signing of the contract, and that there was some hurry about it is shown by the fact that Acting Supervising Architect Jacobs telegraphed to Superintendent Burling to make out the voucher on the same day that the Assistant Secretary authorized it. The contract must have been retrospective, covering work for which Mueller had no real authority before, and had done voluntarily, because the whole additional amount paid for cartage for a year and a half afterwards was only $16,839.

The replies of Supervising Architect Hill, Superintendent Burling, Contractor Mueller, and Assistant Superintendent Prussing have all been published at length in the Chicago papers, and profusely garnished with interviews of Messrs. Burling, Prussing, Smith, and Thompson. The statements in interviews with Messrs. Smith and Thompson are practically rejoinders, and seem to be given with much care and elaboration. All the parties concur in admitting the extravagance and laying the blame upon "the system" originated by Mr. Mullett. It is extremely difficult to condense these statements with justice to all the parties. Mr. Hill goes over the whole history of his administration. He shows that Mr. Mullett was brought into the department again only two months after his own term of office commenced, and was appointed superintendent of six buildings, under Mr. Hill. The Chicago building was one of them. The first thing he did was to advise an alteration of Potter's new design for the fourth story and roof of this building, the stone-cutting of which was then being done. These changes were made by Mr. Hill, and the complications which they introduced prevented the abrogation of Mueller's percentage contract. He then recites all the Mueller contracts, and gives a history of the operations of the three examining commissions and of the fifteen per cent business. The reasons why he did not change this contract have been stated above. The continuance of the original contract was further backed up by an opinion of the Attorney General, given April 27, 1877. The only thing he says in mitigation of the fifteen per cent agreement is that under it the work on this building has not been relatively more expensive than on that of other government buildings built under his direction under similar contracts. Here is suggested an opening for other public-spirited disbursing agents. Mr. Hill confesses to "the inability of the office to satisfactorily control" the cost of work under this system, and Messrs. Burling and Prussing both concur with him. He admits the great extravagance in urns and chimney-tops, but says that he had no opportunity to know of it until the reports came in from month to month. The blame is thereby thrown back upon the superintendents.

In connection with the selection of the assistant superintendent Mr. Hill indulges in considerable personality toward Mr. Smith, which is not a matter of public interest, but he shows that he took every effort possible to see that the assistant superintendent and timekeepers performed their several duties properly, having laid down very stringent rules for their guidance.

The sawing contract is shown to have been submitted to and approved by all the Treasury authorities. There is a great deal of talk about the half-inch allowance in all the documents, especially as to whether or not it should be allowed on sawed stone. This is too intricate a subject to go into at length just here. It involves some fine mathematical distinctions, and the sum presumably wasted being $30,000 bears a small ratio to the *great leak*, which was the excessive amount paid for labor all through, and most of which went into the hands of the well-paid and easy-worked stone-cutters and the lazy carvers.

Mr. Hill then reiterates the assured validity of the contracts, which seem to have been sanctioned by the highest authorities, and states that his only duty was to see that they were carried out good or bad. The sawing question is then gone into in full and he claims that in the long run the sawing saved money, though the experts consulted by Mr. Thompson thought differently.

Mr. Hill concludes with a general defence against all the accusations which could be considered as aimed at his office, including some which are only inferred. There is nothing in the document which seems to show any desire to screen the contractor, though it is so charged by the Chicago press. The worst faults, those which resulted in the waste of money, are freely admitted, but are claimed to have been beyond the power of correction.

In a postscript Mr. Hill refers to a letter of Assistant Superintendent Prussing in which it is stated that he resigned his position before the work was completed, because he would not make himself responsible for its extraordinary cost. He says that "Mr. Prussing's services were dispensed with on the 31st of October 1877, by orders from this office, and the work from that date was placed under the immediate charge of the superintendent."

Mr. Mueller's defence is a remarkable document, covering, as the Chicago reporters say, fifty pages of foolscap. The defence commences by showing how Mueller was oppressed and persecuted by Mr. Mullett after the contract had been awarded, by severe exactions on the contracts. He says he is the only contractor for government work against whom Mr. Mullett discriminated. He says that as a contractor his principles are to make all the money he can, and that the fifteen per cent contract yielded him less profit than he had been accustomed to make from private corporations and individuals. He claims that he did better for the Government than other fifteen per cent contractors. Here is another hint to disbursing agents generally. He claims that the Government was benefited by the sawing contract and that for much of the work done under it the superintendents gave him no pay. He answers the charges in relation to the hauling contract in substantially the same manner as the Supervising Architect. He has a very poor opinion of the architects employed as experts by Mr. Smith. In one respect his reply differs from those of the Government employees. He utterly denies that any effort was made to delay the progress of the work, or increase its cost so as to swell the commissions. He admits that the men played ball, went yachting, and carved sleeve buttons and paper weights, but denies that these things were done during the time paid for. What could be more natural than that these petted workmen on long pay and short hours should indulge in gentlemen's amusements? The sequence seems natural and Mueller and the workmen are vindicated.

There is some choice rhetoric and keen logic in the latter part of the defence. He hits back hard at Mr. Smith. He accuses him of keeping short hours and drawing $5,000 a year from the Associated Press for doing other work that did not belong to the Government. He then takes it upon himself to defend the Supervising Architect, a duty from which Mr. Hill might well have excused him. But his hardest hit at Mr. Smith is that he continued to pay out the very money which he charged was paid on fraudulent contracts, and on which he received a commission; and that this money was paid for the chimneys, dormers, urns, sawing and hauling which form the main subject of his investigation. Mr. Mueller says magnanimously that he does not accuse Mr. Smith of conspiring with any one to defraud the Government, and as a clincher adds that Mr. Smith demanded and examined the contracts which he now says are fraudulent in their nature, before he paid any money at all. He then gives a parting blast to Attorney Thompson and accuses him of conspiring with the Chicago press to defame the character of everybody concerned before any report had been made, and to Mr. Smith for serving his employers of the Associated Press by dealing out to the reporters all the information which might be damaging to the parties against whom the investigation was instituted.

Mr. Burling explains that he has had no immediate control of the stone-cutting during most of the time when the alleged fraudulent work was done. He however admits the extravagance throughout, which he confesses was beyond his control, and ascribes it to the pernicious "system" under which the contracts were made. He kept the Department fully informed of the progress of the work in

every detail by monthly reports, as was his duty. He says that he has resisted many of Mueller's extraordinary claims, that the stone-cutting has always been a source of vexation and anxiety to him, and a subject of frequent protest, as a most outrageous and wasteful manner of doing work. He says further that a large amount of the sawed work on beds was not cut over as alleged.

Mr. Prussing says that the amount of work done on the stone-cutting under his superintendence was fully equal to that done under similar contracts for other work. That they were very exacting in the quality of work required from the men, and that he tried to devise means for getting more work out of them without avail. Finding the undertaking a hopeless one he felt disappointed and galled and resigned his position before the work was done because of this fact.

The supplementary report of Mr. Thompson recites some of the correspondence between Mr. Potter and Mr. Burling, which shows that both were aware of the difficulty of managing the work under the contracts and that Mr. Potter tried to devise some method to prevent the waste of money.

Mr. Smith and Mr. Thompson have both replied to the several defences through reporters of the Chicago papers.

The last statement made by Mr. Thompson is to the effect that the Department has returned to Collector Smith the books containing material portions of the testimony. He construes this to be an instruction to proceed against all the parties, and says he will proceed unless he receives orders to the contrary.

THE UNCONSIDERED USES OF TIMBER.

It is usual to refer the consumption of wood to such causes as the demand for building and engineering purposes, and also such minor ones as the lucifer-match and road-making industries, make. It is true that these are the principal means by which wood is consumed in this and other countries, but there are countless other ways which go to swell the sum total in no insignificant degree, and yet which are left in comparative security, for few persons think of them. As, for instance, in America tulip-wood is much used for wooden bowls, and for the heads of hair brooms or sweeping brushes, for eating and drinking-troughs of cattle, and no inconsiderable portion furnishes wood for Indian canoes. One of the principal uses of the holly, dyed black, is to be substituted for ebony, in the handles of teapots, etc., and the strong, straight shoots, deprived of their bark, are made into whip-handles and walking-sticks. The lime-tree forms the best planks for shoemakers and glovers upon which to cut their leather, and is extensively used in the manufacture of toys and Tunbridge ware, and by the turner, for pill-boxes, etc., and the inner bark is made into ropes and matting. The sycamore furnishes wood for cheese and cider presses, mangles, etc., and when the wooden dishes and spoons were in common use they were mostly made of this wood. It is used now in printing and bleaching works, for beetling beams, and in cast-iron foundries for making patterns. The yew is used by the turner, and made into vases, snuff-boxes, and musical instruments, and it is a common saying among the inhabitants of New Forest, that "a post of yew will outlast a post of iron." Where it is found in sufficient quantities to be employed for works under ground, such as water-pipes, pumps, etc., the yew will last longer than any other wood. Gate-posts and stakes of yew are admirable in wear, and in France the wood makes the strongest of all wooden axle-trees. Of the beech are made planes, screws, wooden shovels, and common fowling-pieces and muskets are also stocked with it, and beech staves for herring barrels are not unknown. The sweet or Spanish chestnut furnishes gate and other posts, railing and barrel staves, hop-poles, and other such matters, as strong and good charcoal, though scarcely equal to that of oak for domestic purposes, but considered superior to that of any other for forges, for which purpose it is much used in Spain, and also in Switzerland. Horn-beam is the best wood that can be used for cogs of wheels, excelling either the crab or the yew, but its application in this manner is about at an end. As a fuel it stands in the highest rank, emitting much heat, burning long, and with a bright, clear flame. In charcoal it is also highly prized, not only for culinary purposes and the forge, but also for the manufacture of gunpowder, into which, on the Continent, it enters in large proportion. In Russia, many of the roads are formed of the trunks of the Scotch pine, trees from six inches to a foot in diameter at the larger end being selected for the purpose. These are laid down side by side across the intended road, the thick end of one alternating with the narrow end of the other, the branches being left at the end to form a sort of hedge on each side of the road. When thus laid the hollows are filled up with earth, and the road is finished, being analagous to the corduroy roads of North America. In Germany, casks are made of larch, which is almost indestructible, and allows of no evaporation of the spirituous particles of the wine contained in them. In Switzerland it is much used for wine props, which are never taken up, and which see crop after crop of vines spring up, bear their fruit, and perish at their feet, without showing symptoms of decay. The uninjured state in which it remains when buried in the earth or immersed in water renders it an excellent material for water-pipes, to which purpose it is largely applied in many parts of France. The butternut is esteemed for the posts and rails of rural fences in America, for troughs for the use of cattle, for corn-shovels, and wooden dishes. Shell-bark hickory provides baskets, whip-handles, and the backbows of Windsor chairs. The pignut hickory is preferred to any other for axle-trees and axe-handles. The sugar-maple is used by wheelwrights for axle-trees and spokes, and for lining the runners of common sleds. Dogwood is used for the handles of light tools, such as mallets, small vices, etc. In the country it furnishes harrow teeth to the American farmer, and supplies the hames of horses' collars, etc., also lining for the runners of sledges. The mountain laurel is selected for the handles of light tools, for small screws, boxes, etc. It most resembles boxwood, and is most proper to supply its place. Bowls and trays are made of red birch, and when saplings of hickory or white oak are not to be found, hoops, particularly those of rice casks, are made of the young stocks and of branches not exceeding one inch in diameter. Its twigs are exclusively chosen for the brooms with which the streets and court-yards are swept. The twigs of the other species of birch, being less supple and more brittle, are not proper for this use. Shoe lasts are made from black birch, but they are less esteemed than those of beech. Immense quantities of wooden shoes are made in France from the wood of the common European alder, which are seasoned by fire before they are sold. The wood of the locust is substituted for box by the turners in many species of light work, such as salt-cellars, sugar-bowls, candlesticks, spoons and forks for salad, boxes, and many other trifling objects, which are carefully wrought into pleasant shapes, and sold at low prices. The olive is used to form light ornamental articles, such as dressing-cases, tobacco-boxes, etc. The wood of the roots, which is more agreeably marbled, is preferred, and for inlaying it is invaluable. Of persimmon turners make large screws, and trunnen mallets. Also shoemakers' lasts are made of it equal to beech, and for the shafts of chaises it has been found preferable to ash, and to every species of wood except lance-wood. The common European elm is used for the carriages of cannon, and for the gunwale, the blocks, etc., of ships. It is everywhere preferred by wheelwrights for the naves and felloes of wheels, and for other objects. White cedar serves many subsidiary purposes. From it are fabricated pails, wash-tubs, and churns of different forms. The ware is cheap, light, and neatly made, and instead of becoming dull, like that of other wood, it grows whiter and smoother by use. The hoops are made of young cedars stripped of the bark, and split into two parts. The wood also supplies good charcoal. The red cedar furnishes staves, stopcocks, stakes, and is also used for coffins.

A few others may be briefly named, separating into trades as follows, applying to the American manufacture: —

Sieves, usually of black or water ash for the bottom, and oak or hickory for the circle; whip-stocks, white oak and shell-bark hickory; picture-frames, white pine and sweet gum; saddle trees, red maple and sugar maple; screws of bookbinders' presses, hickory and dogwood; hatters' blocks, gum shovels, butternut; shoe lasts, beech and black or yellow birch, etc.

This slight sketch, which is by no means complete, will serve to give an idea of some of the ways in which timber is consumed, besides being wasted and put to its legitimate purposes in other manners. The items may seem beneath notice, but the aggregate must be something important. — *London (Eng.) Timber Trades Journal.*

THE QUALIFYING OF ARCHITECTS.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — In an "editorial" under the above heading in your Journal of July 7th, 1877, you take ground in favor of some sort of certificate of professional qualification of a nature to be determined in the future, and you refer particularly to the "Prussian System," and the customs which prevail in the practice of law and medicine.

In the same article you admit that the French and English require no standard and that the eminent architect M. Viollet-le-Duc is not even a graduate of the Ecole des Beaux-Arts. No mention is made of what I believe to be the fact, that civil engineers who deal more fully and on a larger scale with intricate problems of construction, which clearly concern the personal safety of large numbers of people, and who are continually tempted by their employers to push their calculations to the very verge of safety, are allowed to practice without let or hindrance.

I would not be understood for a moment to be an opponent of the fullest education; and I most heartily desire the time when we may have a great national school of science and art. At present the facilities for such school education are very limited, and much individual effort must supplement what can be obtained in them.

I am credibly informed that "by common law an unskilful person representing himself as a skilful one becomes liable for damages resulting from want of skill."

Every architect, engineer, or other person should be held responsible, life for life and dollar for dollar, for the safety of his work whenever and so far as he is allowed to control it, but it seems entirely unwise and undesirable, and tending toward some of the worst phases of "trades-unionism," to attempt to divide our profession by any arbitrary standard of text-book examination, either forced or voluntary, especially by one founded on the "Prussian System."

If we follow any precedents in such matters, they would naturally be French or English; and it seems most absurd to precede these nations in this particular matter when we blindly follow them in

ancient abuses, such as that base of our calling, unpaid competition.

The "so called architects" of this country are of all degrees of fitness. They include in their ranks many half educated men who never make a disastrous failure, and some clever artists and "schoolmen" who, at least, never erect a successful building. Put the schools on the right track and the standard will gradually advance. A conscientious man of moderate abilities and attainments can safely be trusted by the public with their work if he be held to strict accountability. What he does not know he can learn, or he can do what the best have been forced to do, call in the expert advice of an *unqualified* engineer. If the schools succeed in turning out men who can successfully compete in all ways with the older occupants of the field, the latter will of course have to give place. It will be, as it is to-day, a question of "the survival of the fittest."

John A. Fox.

MR. HOLLY'S MODERN DWELLINGS.

To the Editor of the American Architect:

Dear Sir,—How can we, as Americans, expect any development of artistic talent at home when we find those to whom we should look for originality coolly contenting themselves with either shamefacedly copying or very apparently adapting the designs of our more cultivated, if not more gifted, cousins across the water.

In Mr. H. Hudson Holly's book, entitled "Modern Dwellings in Town and Country, adapted to American Wants and Climate, in a series of One Hundred Original Designs, comprising Cottages, Villas, and Mansions, with a Treatise on Furniture and Decoration," recently published by Messrs. Harper & Bros., instead of finding, as we have every reason to expect, something new, we are quite disappointed by a reproduction of designs which have become familiar to us through years of intimate acquaintance. It is true that there is in some of the illustrations a conglomeration of good ideas, in which "Talbert's Examples," the London *Building News*, and Cox & Sons' Catalogues each play their respective parts; but we look in vain for something by Mr. Holly himself.

I should have thought he could have at least introduced some original suggestions in decoration, but his remarks are as hackneyed as his designs.

Mr. Holly's book, however, has one improvement over his magazine articles: he has, I see, taken particular pains, in some instances, to acknowledge his sources of information and illustration, but a few more inverted commas, and these lines of Montaigne on the title-page, would, I think, have been a still greater improvement: "I have gathered a posie of other men's flowers, and nothing but the thread that binds them is my own."

W. S. C.

NOTES AND CLIPPINGS.

The Washington Monument.—The adoption, by both houses of Congress, of the Conference Report, will cause the Washington Monument to be completed in accordance with the modified design of Mr. Larkin G. Mead. We do not know what about Mr. Mead's design has been modified, but it will be remembered his original proposition was to place upon the uncompleted obelisk a statue of General Washington eighty-five feet high, and made out of thin hammered metal.

The Mississippi Jetties.—On June 8th the Senate passed by a vote of 35 to 2 a bill which authorizes the Secretary of the Treasury to advance half a million dollars to Captain Eads on account of his next payment. This would allow certain outstanding accounts to be settled for whose payment much pressure has been brought to bear. The bill, moreover, provides for the payment of another half million dollars in monthly instalments as the work proceeds. As the bill was reported on favorably in the House, there is small doubt that it will be enacted and the success of the enterprise assured.

Water-Supply in England.—For some time past the English papers have been discussing the water supply of the great city of Manchester, and Mr. John Ruskin has been particularly loud in his reprobation of the scheme for tapping Lake Thirlmere. But the foulness of the water-supply of Manchester is only a type of many similar cases which have long demanded investigation and, if possible, remedy. During the past month a conference was held under the auspices of the Society of Arts, to consider the question of a national water-supply system; to this conference was presented in pamphlet form a statement of what had already been done in investigating water-supply, and reports from those qualified to make them on what remained to be done to remedy the increasing difficulty: with these was incorporated a mass of returns from medical and sanitary authorities throughout the kingdom. The discussion was active and interesting, but full reports of it have not yet reached us. The chief result seems to have been a recommendation that a small permanent commission be appointed, which shall "collect facts connected with water-supply in the various districts throughout the United Kingdom, in order to facilitate the utilization of the national sources of water-supply, for the benefit of the country as a whole." This recommendation seems to have been in pursuance of a wish expressed by the Prince of Wales in a letter addressed by him in January last to the Society of Arts, of which he is the president. The hints of the real intention of this proposition which reach us show that it is most comprehensive in its scope, embracing artesian-wells, aqueducts, and rivers, and a systematic tapping of remote lakes, where the water is as yet uncontaminated. Sir Henry Cole, who presided at the conference, averred that the scheme was not only practicable but could be made to pay, even should it cost five hundred million or even a billion dollars.

The Cincinnati Schools.—The forty-eighth and last annual report of the common schools of Cincinnati has just been issued, and we glean from its pages some facts that may be of interest to the readers of the *American Architect*: The president, Mr. A. C. Sands, states in his annual report that the total number of pupils enrolled is 30,049, an increase of 1,127 over last year; that the average daily attendance is 24,073.7. The estimated number of children in this city between the ages of 6 and 14 is 59,939, and of this number 46,642 are receiving daily instruction at public, church, or private schools; there are altogether 34 school-buildings of all kinds with a total of 487 rooms. The usual size of these rooms is 28′ × 33′. In these 34 buildings there is a total floor space of 356,156 square feet, or 10,457 square feet average per building, or 731.59 square feet average per room. This would give an average of nearly 12 square feet to each scholar. There is 5,023,787 cubic feet space in all these rooms, or an average of 10,317 for each room, which would give an average of 167.6 cubic feet for each scholar. The greatest number of cubic feet of air per scholar in any one school is 342.4, and the least 125.4.

There is a total of 110,599 square yards of play ground, an average per house of 3,253, per scholar of 3.2 square yards.

Prof. J. B. Hough, M. D., of the Miami Medical College, was employed by the Board last year to establish clearly and fully by surveys and chemical analysis the sanitary condition of the Cincinnati school-houses. The out-door atmosphere of the city was taken as a standard of comparison and the average air of the densely populated parts of the city was found to contain in 100,000 parts:—

	By Volume.	By Weight.
Nitrogen	78,031	76,365
Oxygen	20,569	22,677
Vapor of water	1,339	879
Carbonic acid	5	35
Ammonia	4	3
Other Vapors	7	3
Total	100,000	100,000

"A number of school-rooms were found to contain considerable more than one tenth per cent of carbonic acid; and even in the best ventilated rooms of the newer houses the per cent is quite materially above the average outdoor quantity." "In a large majority of cases the ventilation of our school-rooms is injuriously defective. Most of the pupils are breathing, for several hours each day, an atmosphere containing more than one tenth per cent carbonic acid. In many cases the vitiation reaching nearly double that amount."

Further in his report he recommends mechanical or forced ventilation.

The St. Gothard Tunnel.—There seems to be a very great chance that it will prove as difficult a thing to complete the St. Gothard tunnel as it was in Massachusetts to finish the Hoosac tunnel. Begun in 1871 for the purpose of making the route to Italy by the St. Gothard pass as attractive as it formerly was, by reason of the famous diligence road, which was built in 1830 at a cost of $375,000, and which had made this the favorite road until the Mt. Cenis Tunnel diverted both travel and traffic from this part of Switzerland, its estimated cost was $47,400,000, and the time for its building was limited to ten years. To build this tunnel, which would be nine and a quarter miles long, together with the railway, Germany and Italy agreed to subscribe $17,000,000, while the balance was to be raised by the Forest Cantons and the Federal Council. As the work has gone on it has been found that the estimated cost would be probably about half as much as the real cost, and as Switzerland has suffered as much from hard times as other countries, it is found that the work must be abandoned for a time at least. Not long ago an endeavor was made to obtain a supplementary grant from the Canton of Zurich in aid of the enterprise, but when it was submitted to the popular vote its defeat was so decisive that the present prosecution of the work seems impossible; for the Canton of Zurich is at once the richest canton, and the one which would most benefit by the new route.

The National Statues at the Exhibition.—*La Semaine* finds good words to say of but few among the twenty-two statues which, representing the nations that take part in the Exhibition, decorate the river façade of the building on the Champ de Mars. The statue of Hungary by Lafrance seems to be the most successful of these female figures of more than heroic size. Perhaps, although professional sculptors were engaged upon the work, many of them, too, of acknowledged merit, not much was to be expected, since only eight hundred dollars were appropriated for each statue, which were to pay for model, moulding, and the installation of the figure in its appointed place.

The Aquarium.—It is said that the aquarium is likely to be a failure, because some substance used in the construction of the tanks, and of which it is impossible to get rid, poisons all the fishes.

M. Giffard's Balloon.—The captive balloon, which will be able to raise about fifty persons some sixteen hundred feet above the level of the ground, will be secured by a rope which is calculated to withstand a strain of fifty-five tons, although it is not intended to use the balloon when the strain exceeds thirteen tons. The covering is made of alternate layers of linen and India-rubber, upon which for weeks past some hundred girls have been busy stitching the cloths together in a large building built for this purpose. The weight of the netting is said to be enormous. The balloon is to be filled with pure hydrogen, made on the spot by treating iron filings with sulphuric acid. It will be about one hundred and twenty feet in diameter, and will have a displacement at the level of the earth of about 31,750 cubic yards, which will increase to 32,500 cubic yards when it reaches the highest elevation allowed.

The Roofs of the Main Building.—It was at first intended to cover the roofs of the galleries in the Champ de Mars with zinc; but as this proved too expensive galvanized iron was used, which was not bought out-and-out, but is rented of a large firm for a year at a cost of $90,000, thus effecting a saving of some $140,000.

Statue of the French Republic.—M. Chesshuger's colossal statue of the Republic has been approved by the Fine Art Commission, and is to be set up in the grounds of the Champ de Mars, opposite M. Bartholdi's statue of Liberty.

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THE report of Judge French, Assistant Secretary of the Treasury, to whom were referred the accusations of the Collector and Assistant Attorney-general at Chicago concerning frauds in the stonework for the Custom House of that city, is a most reassuring document for everybody who was concerned in the administration of the work. It relegates the blame for the irregularities, which it admits as a necessary concomitant of the fifteen per cent contracts, to the workmen and time-keepers. The contracts, it says, were approved by the Secretaries of the Treasury who were in office when they were made, as well as by the Supervising Architect; they are responsible for them as well as he, and it is not worth while making investigations for the mere sake of throwing blame upon persons so long out of office. It is an unnecessary insult to former Secretaries to intimate that they made these contracts with fraudulent intent; and there is no evidence to show any actual fraud or misrepresentation on the part of Mueller, the contractor, or collusions with any person whatever. "If, in dealing with the officers of the Treasury Department," says the report, "he has otherwise gained any advantage," — that is, we suppose, if he has managed to outwit them, — "he is fully entitled to enjoy it." Judge French considers the contracts the most expensive means of getting government work done, but thinks they were made with the desire which leads private persons to have their work done by the day, — the desire to get the best possible quality of work. Of the contract for hauling stone, he says that it is "a valid legal contract," and the subordinate officers of the Government had no duty except to see that it was faithfully executed; and so the contract for sawing stone is declared to be a proper one, and there is no evidence of fraud in the administration of it. As for the quality of the stone furnished, the report recalls the fact that the opposing reports of the different commissions which examined it leave room for different opinions, and says, finally, "There is no doubt that Buena Vista stone is unfit for so large a building; but there is no evidence to show that the stone furnished was not the best the quarry offered."

THE Assistant Secretary admits that the cost of the attic was excessive, and that under a better system the work could have been done at half the price. He is probably justified in adding his conclusion that "no degree of diligence on the part of government officials above the rank of time-keepers could extort from laborers employed under fifteen per cent contracts anything like a fair day's work, such as they would perform when it is their interest to perform the greatest amount of labor rather than the least." Of the officials concerned he acquits the Supervising Architect, Mr. Hill, of all blame. Mr. Burling, who was the General Superintendent of the whole building, is not to be charged with fraudulent intent unless he assented to some fraud, and of this there is no proof; and as to Mr. Prussing, who was the superintendent of stone-cutting, and who declares that he knew of the want of faithfulness in the workmen, but was powerless to prevent it, there is no clear evidence of fraud on his part. It is evident, however, says the report, that the workmen did by a common understanding delay their work, and the inference is almost irresistible that there was between the government time-keepers and the stone-cutters a combination, if not a conspiracy, to defraud the Government by prolonging the work. Finally, Secretary Sherman approves the report of the Assistant Secretary, with the comment that the chief cause of the excessive cost of the stonework is in the faulty principle of fifteen per cent contracts. He does not think that the superintendent, contractor, and chief subordinate were greatly at fault in the supervision of the work. The contractor under the fifteen per cent system he considers to have been as much in the employ of the Government and as much bound to protect its interest as if he had been salaried by it. The question of prosecuting any of the persons accused is referred to the Department of Justice. He nevertheless suggests that from the next fiscal year the superintendent and subordinate officers should be changed.

THE only respect in which the report seems to suggest criticism is its apparent desire to put the best possible face on the whole matter. Making due allowance for this, its general view of the situation seems to be a judicial one. We have not to consider what control might have been exercised by exceptional sagacity or efficiency on the part of the officials. The working of the system has been deplorable enough; but it was a matter of extreme difficulty to make it anything else. We have seen nowhere any evidence which throws blame upon the Supervising Architect. The worst thing that has appeared against the Superintendent and Assistant Superintendent was their neglect to protest energetically at head-quarters against the way the work was going, when they found it, as they acknowledged, impossible to resist it. This we would have expected them to do; and this, by their own showing, was the thing they did not do. As for the contractor, the Secretary, in his rather optimistic commentary, at least does not go so far as to commend him for the fidelity and care of the interests of the Government which he holds him bound to render; and we should be very much surprised to know that Mr. Mueller took the Secretary's view of his position, — still more, that he acted according to it. We have seen no evidence that he took any care of the interests of the Government, but there are evidences, as in the hauling contracts, that he was keenly alive to his own. As we have intimated before, the conditions of the contract seem almost to have removed from him the temptation to fraudulent action. With the rare advantage of the two hundred and fifty men, whom he was obliged to keep on the work, all actively interested in increasing his profit while they nursed their own, he could not have been more favorably placed to gather the fruits of unfair dealing without doing its dirty work. Under these circumstances only a depraved instinct would have led him to contrive frauds, when a simple policy of *laissez-faire* was just as profitable and more secure.

THE dispute between the city of Chicago and the county concerning the material of the Court House, of which the letters of our Chicago correspondent have spoken, has been decided in favor of the city. The county sued for an injunction to restrain the city from using the Bedford limestone because it was unlike the Lemont limestone, which the county had thus far used, on the ground of a contract which says that "the general exterior design of the building shall be of a uniform character and appearance," and the court has dismissed the suit. The judge's opinion, as we find it reported at length in the papers, does not seem to be convincing, being chiefly a general discussion of the proprieties of the case, without much heed of what would seem to be the main question, — whether two buildings, or two halves of a building, of stones which differ in color and aspect, can be said to have a design of a uniform character and appearance. The city thereupon proposes, it is said, to go on at once with its half in the Bedford stone, but the county commission threatens an appeal to the higher courts. The commission itself seems to be in a bad way. The people of the county voted last year against issuing bonds to meet the cost of the county building; and since the county treasury is empty, the warrants which the commissioners have issued to the contractors are dishonored, and after being sold for some time for what they will bring cannot now be sold at all.

The sudden introduction in our large cities of innumerable elevators, most of which are hung by wire ropes, has led many people to wonder what will happen when they have had a few years' wear, and why there should not, after a while, be a general breaking of ropes, and consequent accidents all over the country. The hydraulic elevators with continuous or telescopic piston were secure against this danger, but on account of their cost, both in construction and in service, have gone into disuse, in this country at least, and rope elevators of one form or another have universally taken their place. Even where water-power is used it is applied in a detached cylinder and communicated to the car by ropes. The ropes are made of iron or steel wire, as the material least liable to wear; and the question of the endurance of wire ropes, therefore, becomes a very important one. It is a part of the question, still unsettled, of the permanent behavior of iron under continued stress. There are those who to this day fight against the doctrine, which nevertheless seems abundantly proved, that continual vibration ultimately changes the structure of iron from fibrous to crystalline, and so weakens it. It is clear that under favorable circumstances this action may be extremely slow, as in the case of piano wires, which may endure a generation of hammering under great tension. In the case of such comparatively supple structures as wire bridges, though they are probably doomed to give way before they are worn out unless they are renewed in season, there is time as well as inducement to guard against the danger by repeated tests. But everybody knows at least that reiterated bending weakens wire, whether it be by granulation or by the constant extension of its fibres; yet in the case of elevators, which are needed for constant use, the temptation will be strong to keep them going till the ropes give way, unless some obvious deterioration gives warning; there is, therefore, room for serious apprehension as to what may happen by-and-by. A late accident in Chicago, wherein life was lost by the breaking of an elevator rope, has led some one to print in the Chicago *Tribune* letters on the subject from the Messrs. Roebling, the designers and builders of the East River Bridge, and others. After saying that wire ropes from frequent passing over pulleys become granulated and worthless, without showing visible deterioration, they give the important but neglected caution that "large drums, sheaves, and pulleys are absolutely necessary for the long life of a wire rope," a matter in which, they say, the best elevator builders are apt to be interfered with for want of room. Cast-steel ropes, they add, require very large drums, and those of Bessemer steel are almost worthless. They think that the ropes on passenger elevators ought for safety to be changed every two years.

In regard to the East River Bridge it is said that the decision of the Trustees to use it for trains of the ordinary four feet eight and a half inch gauge was in direct opposition to the advice of Mr. Roebling, their engineer. This is a responsibility which, it seems to us, no inexpert board has a right to assume in a matter that involves danger to life and limb. It is too much of a piece with the action of the late president of the Lake Shore Railroad, when he defied the advice of his engineer, and had the Ashtabula bridge constructed according to his own notions. Mr. Roebling's opinion was that the vibration of the bridge under violent winds would make it dangerous to cross it with trains of the ordinary gauge, and that trains of six feet gauge would be too heavy for it. Under these circumstances, if the use of the bridge for steam trains is considered vital, as we suppose it is, the suggestion which has been made is reasonable, — that the engineer should be invited to consult with a committee of his professional brothers. If a number of his fellows whose judgment commanded his respect should fail to agree with him, an engineer or an architect may be fairly expected to waive his opinion; but for an ordinary committee (which from a professional point of view is an ignorant one) to override his opinion on a question of safety is to assume an utterly unwarrantable risk. We must say, by the way, that it seems rather a narrow chance to run a train of the common gauge over a bridge that is not thought strong enough for one of six feet gauge.

We suppose it will be many years before it is decisively proved that the works of Captain Eads have been successful, although if they are to be a positive failure the proof of it may be expected to be made evident much sooner. It seems certain that the work thus far done is successful and has justified the action of Congress. If, as is stated, a new bar is not forming just beyond the jetties, it is probably owing to the action of an ocean current which, running westerly, sweeps under the outflowing river water and prevents the immediate deposit of the sand and mud contained in it. The success of the undertaking seems to be dependent on the strength of this westerly undercurrent, for unless it is sufficiently strong to drive the muddy water, diluting it in passage with its own water, so far from the mouth that the sediment must be deposited over a wide area, it will probably only lodge it on the western side of the jetties and make it necessary to extend their line from time to time. The jetties have been subjected to severe criticism by General Humphreys, Chief of C. S. Engineers, who has never believed in them, and has, as Captain Eads shows in a letter called out by a recent pamphlet by General Humphreys on the subject, done all that he could to nullify by official obstructiveness the working of the Jetty Act as passed by Congress. Captain Eads states that the act was framed with the special purpose of excluding General Humphreys from any control of the work, and that it contained these words: "Said Eads shall be untrammelled in the exercise of his judgment and skill in the location, design, and construction of such jetties and auxiliary works." Yet, although it was provided that reports should be made directly to the Secretary of War, General Humphreys directed that the inspecting officers should report to him, and so during one year obtained information in regard to the works which he utilized by incorporating in memoranda which he from time to time published in opposition to the undertaking. A successful appeal was at length made to the Secretary of War which put an end to this seemingly unjustifiable infringement of the Jetty Act, which so explicitly declares that Captain Eads shall be "untrammelled."

There is, we know not its origin or age, a superstition that it is unlucky to build in marble. The temples of the Greeks and Romans clearly show that the belief is of less age than themselves, and it is probable that it gathered form during the Dark Ages. Buildings built in these times are so few, and their history and chronology so open to doubt, that it cannot be determined whether in the little building that was done marble was or was not used. Whether superstition had anything to do with it or not, few buildings during the succeeding Middle Ages were built of marble, and of these few the Cathedral of Milan is easily the most important. But we question if the pious Jean Galeaz, had he known the blight that was to fall upon his gift, would have bequeathed his marble quarries to the architects of the Cathedral; of which bequest one of his descendants reproachfully said, "He gave enough marble out of which to carve a thousand statues, but they would insist upon building a church with it." If the Cathedral had been built of stone from this quarry only, it might be suggested that the pious Galeaz had attempted to ease his path through purgatory by a gift that was little costly to his heirs. Be this as it may, the curse that hangs over marble buildings has fallen on this most magnificent of Italian Gothic — Arab-German we are told it should be called — cathedrals, and is causing it to decay and crumble away beyond possibility of check or satisfactory restoration. A recent professional report upon the cathedral states that the whole building is affected by the peculiar atmosphere of the country, which is honey-combing the surface right and left, so that it has the appearance of being attacked by some eruptive disease, which affects the stone coming from different quarries in as many different ways. All this is going on above ground, while water and dampness have so affected the lower walls that the building rests on very insecure foundations. Now that attention has been drawn to this corroding action of the air, — it had before this escaped the notice of all conservators of the building, who contented themselves with making specific repairs when necessary, — a careful inspection of the building shows a most disheartening condition of things. Statues, pinnacles, spires, carving, even monolithic columns surely, if slowly, are crumbling and disappearing; even bronze work, gold, and crystals are said to be affected by the climate.

The royal report on the building is, says the *Building News*, "far from being a Blue or Yellow Book of the ordinary character." It is carefully illustrated with drawings and photographs of the dilapidated portion, and offers visible proof that its statements are not foundationless, but that this famous building, begun in 1387, or thereabouts, and still incomplete, though, as at Cologne, repairing old parts and building new go on side by side,

this building which so impressed Napoleon Bonaparte that he spent many millions of francs in continuing the work, is in danger, if not of actual material destruction, at least of irreparable artistic injury. Search is making for marble that is able to resist the climatic influences at work, but it has hitherto been unsuccessful, and it is only too probable that the course that will be followed is to tool over the whole building, inside and out, scraping the walls to a dazzling whiteness, and recutting mouldings, carvings, and statues, destroying in so doing all the original sharpness and delicacy of the cutting, and leaving in their places either rounded and debased forms or lines wrongly sharp and features unduly accented. It is not impossible that the scraping and cleaning of the Cathedral at Florence, to which we called attention some time ago (*American Architect*, No. 116), may have been rendered necessary by a similar perishing of the marble. If the Cathedral is by any processes of repair or restoration to be endued with a Parisian newness, it is to be hoped that the plan approved by Bonaparte, of removing from its vicinity the squalid buildings which cluster about it, may be carried out. Of late years an English company has done something toward improving the surroundings of the Cathedral, and the Galleria Vittorio Emanuele, designed by the late Signor Mengoni, is the first feature of their scheme that has been carried to completion.

BYZANTINE ART AND THE CESNOLA COLLECTION.

THOUGH the treasures of the Cesnola Collection may appeal more strongly to men of other crafts, it has, nevertheless, points of special interest for the architect which have not as yet been satisfactorily dwelt upon. One such point is the testimony it may give as to the origin of what are known to us as Byzantine types of decoration.

It will scarcely be claimed by any student of the history of art that the antecedents and predetermining causes of the Byzantine style, as it arose in the East to be ingrafted on the Romanesque architecture of the West, have ever been thoroughly investigated and clearly set forth. All writers agree that it was the product of Greek artists, accustomed to the use of Roman constructive forms, and, it is vaguely added, subjected to Oriental influences. All that is new and strange, all that is not distinctly and indisputably classic, is laid to this Oriental influence; but what that influence was, by whom exerted, why so readily received, and how so wonderfully elaborated are questions that have never been authoritatively answered, that are rarely even stated.

Now "Oriental" is at best a vague, amateurish word, which should never be used in technical treatises unresolved into its possible elements, — Persian, Hindu, Chinese, or other, as the case may be. However it is in literature, or philosophy, or studies, in art at least there is no universal style that can be called "Oriental," unless we use the word style so loosely as to find its equivalent in the subtle coloring which belongs alike to all branches of Eastern art. Furthermore, if some claim that an indistinct idea *does* exist in most minds when they read of an "Oriental style," yet such an idea would by no means correctly typify the influence that worked to produce Byzantine forms. We could not call the strange new influence Persian or Indian or Chinese, nor is it allowable to jumble up our ideas of all these and with equal vagueness and falsity to call it "Oriental."

If we turn, however, from many examples of misapprehension and neglect and look for a really suggestive inquiry into the origin of the style, we shall find one such in the pages of M. Viollet-le-Duc's "Discourses on Architecture." It is truly but brief and sketchy, yet it may in the future supply the text for more radical investigations, and even in its present shape it is provocative of discussion. M. Viollet-le-Duc, basing his arguments on the ideas, sketches, and photographs brought from Jerusalem by M. de Saulcy, gives us in a few pages his reasons for believing Byzantine architecture to be a blending of Greek and *Semitic* art forms, with the retention of many Roman modes of instruction.

A characteristic Semitic art in any shape will seem a strange thing to many, so familiar are we with Mr. Fergusson's dogmatizing on the subject. Among other theories, artistic and ethnographic, which, though sometimes conceived with prejudiced eyes, Mr. Fergusson yet follows out relentlessly, we find one to the effect that no Semitic people has any art instinct or has ever produced original works of art. He contradicts this theory, it is true, by one little phrase which notes the "Jewish vines and foliage" of the *Gate Huldah* as the saving element in its somewhat chaotic decoration. But by no word does he credit this Jewish work with any influence on the style of subsequent centuries.

I have not space to trace the arguments which M. Viollet-le-Duc (in his easily accessible volume) uses to support his assertions that parts of the substructure of the Temple at Jerusalem, including the remains of an arch which sprang from it, date back to the Phœnicio-Judaic epoch; that the tombs in the Valley of Jehoshaphat are the tombs of the kings to whom their popular nomenclature attributes them; that the fragment of an arch (figured in his pages) is of Herod's time and the *Golden Gate* contemporary with it, and that the details of all these are neither Greek, Assyrian, Egyptian, nor Roman. Many writers dispute such chronology. M. de Vogüé,[1] for example, gives to Solomon nothing but the (destroyed) east side. The mighty foundations are all ascribed to Herod, while the *Golden Gate* and the other decorative works fall to the credit of Justinian and the sixth century. There is no historical record to go by; style is our only help in deciding between the so opposite views of such noted critics.[2] The reproductions of the decorative work seem to speak for M. de Saulcy, and even if this work be as late as M. de Vogüé puts it, yet "native artists, with traditions of their own," must have been employed, for outside of the eastern portion of the empire, as M. Viollet-le-Duc goes on to say, there is no Roman work to be found which at all resembles it, showing as it does "a dry, precise, flat, but sharply cut method of execution, a *primitive* touch of the chisel, qualities alien to those of the sculpture of the Lower Empire, which is soft, clumsy, of high relief and great monotony of treatment." Though these fragments have been made the turning-point of the whole dispute, it is their position that has alone made them so exclusively prominent. Even if they fail M. Viollet-le-Duc, his theory by no means falls to the ground. There is still plenty of evidence to carry the style of work under consideration back at least to Herod's time. The pages of M. de Vogüé's own works and of Texier[3] give ample proof that in the lands they describe an art existed, as far back as the first Christian centuries, which is truly and distinctively Byzantine. We have no other word for it, though the time was far distant when Byzantium should pose as the birthplace of the new child of art. St. Sophia (A. D. 537), which has so often been considered almost the first-born of the style, was merely the culmination of a progress both long and slow. The first dome with pendentives, for instance, whose date we know, is found in Southern Syria, and is of the year 282 of our era. The Greek architects, who had been powerless to stop the rapid fall of art in the West between Augustus and Constantine, were, between Constantine and Justinian, developing in the East, where they were less fettered by the iron requisitions and love of precedent of their Roman masters, a new style of architecture. But when we see how different this style became from anything that had gone before, we find it hard to believe that it sprang unmotived from the brains of men who had seen nothing but the decorative works of Athens and of Rome. M. Viollet-le-Duc, in speaking of this rise of Byzantine art, claims it to have been a *rise* in the fullest sense of the term, a Renaissance of Greek art in new shapes, not a demoralizing nor a barbarizing of Roman art, as is so often said. M. Texier, on the contrary, takes occasion to show his lack of appreciation of the service he has himself in his explorations rendered to the history of art, when he speaks of some Salonican capitals as "giving in their *b-four* work," like some in the pre-Justinian church of Sts. Sergius and Bacchus at Constantinople, "the only symptom of *declining* art." This of one of the beautiful Byzantine types that were growing out of the contemptible Roman art of Constantine!

M. Viollet-le-Duc says further, that no revival can come from decay alone. Such decay as this of Roman art could not by itself have given birth to the new and living freshness of Byzantine forms. Where are we to find the source of the new blood that must have been infused? How, even if we go back from Justinian to Herod, if at the same time we claim for Palestine and Asia Minor and Syria and Thrace that their building was done by Greek and Roman architects who had studied no otherwhere than in the classic schools?[4] Five centuries of retraced steps do not solve the problem, if we find in all of them no outside influences coloring the main stream of classic art. Looking for such outside influences, Assyria and Egypt fail us. The Parthian remains,[4] which are decorated partly in this "Byzantine" style, are not much earlier than the Christian epoch, and the only Persian works which show analogous types are of the Sassanid dynasty and probably the sixth century A. D. All of these show merely the same thing we have seen nearer the Mediterranean, — show the unnamed influence acting upon classic traditions. We seem to find ourselves obliged to accept, as a "working hypothesis," M. Viollet-le-Duc's assumptions as to the Phœnician origin of the style, and to cast about in search of further facts than he adduces to support or to refute these assumptions.

Passing by many published sources which give hints of nothing more as to the recurrence of the types we seek in remains indisputably Phœnician, I wish here to notice myself the testimony of the Cypriote collection in the Metropolitan Museum. The Phœnician work, which by all critics is allowed to be very distinct from the work of Greek, Egyptian, or Assyrian, has been often discussed in relation to the probable influence of Phœnician on early Greek art. This is a separate and distinct question, the solution of which has been differently found by different writers. Our idea is another, — that there was a native Semitic art existing in the Phœnicio-Judaic epoch, and that this art subsisted through many centuries, not in Greek developments, but on a meek and inconspicuous side-line of its own, to become the consecrate style of the early Eastern church, to blaze perfected in St. Sophia, and to be found in identical decora-

[1] Syrie Centrale. Églises de la Terre Sainte.
[2] The question is argued by M. de Saulcy and M. de Vogüé through various volumes of the Revue Archéologique.
[3] Byzantine Architecture.
[4] See Loftus's Travels.

tive shapes throughout the Romanesque of Western Europe, but especially of Germany, as lying nearest to the East.

Certain engravings in General di Cesnola's book[1] seemed, in reproducing objects of great antiquity, to show the well-known type of decoration, and an examination, with an eye to its recurrence, of the collection itself yields far more striking evidence for the truth of M. Viollet-le-Duc's assumptions than one could even have hoped for. Statues, metal-work, vases, lamps, all give more or less distinct witness in his favor.

What is the type for which we look? We can, perhaps, have no clearer description, as far as it goes, of true Byzantine ornament than is given in Owen Jones's "Grammar of Ornament" by Mr. Waring, when he says it is "distinguished by broad-toothed and acute-pointed leaves, which in sculptured work are bevelled at the edges, are deeply channelled throughout, and are drilled at the several springings of the teeth with deep holes. The running foliage is generally thin and continuous. . . . . Thin interlacing patterns are preferred to geometrical designs." "Leaf within leaf," says the same volume, treating of the classic acanthus, was the system of Greek and Roman decoration, and was elaborated even to excess by the Romans." "Not until this system was abandoned for a continuous stem, throwing off leaves on either side, was there progress in decorative art." This is as far, however, as we can follow this volume, for it then cites St. Sophia as the first example of this sort of design. At Persepolis, — in the Sassanid remains, — we find "pointed and channelled leaves, and stems without the ball and leaf." These formulas define pretty well what we are to look for, if we note in addition that the interlaced and geometrical Byzantine patterns are very different from the "arabesques" that were later to grow out of them; that in the sculpture the relief is low and the effect flat, and that there are certain favorite and oft-repeated motives that have no exact counterparts in Grecian art, such as pecking-birds, the "St. Andrew's cross with foliated ends contained in a circle,"[2] bunches of grapes with or without their leaves, various zig-zag patterns, and the so universal beadings or strings of pearls.

Looking for these things first in the Cyprione statuary, we find many heads and figures that are unmistakably Assyrian or after Assyrian models, for in addition to other evidences they have the flower-like ornament so profusely used in Assyrian art, the ornament that in modern work is called a "marguerite." Other figures, also un-Greek in type, have wreaths of fine foliage. One, No. 220, with olive-like leaves, is very primitive, yet one sees that it is not the archaism of Greece. Another, a female figure, bears a branch of similar foliage, which, in the designing and workmanship of its channelled leaves, resembles most closely some little cuts given by M. Viollet-le-Duc as foliage from the tombs in the Valley of Jehoshaphat. In no case does this foliage occur in conjunction with the Assyrian marguerite, as it presumably would do if it also were a primitive Assyrian motive.

The pottery collection is in such confusion — perhaps as yet unavoidable — that one has only one's own judgment to rely upon for dates and nationalities. But it is comparatively easy, even for a non-expert in ceramics, to find the typical Greek work, and Egyptian influence is always easily marked. Assyrian is less distinct, perhaps, yet we can trace it and credit it, for example, with the marguerite, when it occurs, and with patterns resembling the famous sacred tree. What remains must be in great part Phœnician. Incised hatching and concentric scrolls are two features which General di Cesnola and others claim as primitive Phœnician, and on examination we find, in connection with these, patterns less primitive and of the exact type we seek. There is a little peculiarly shaped black lamp, with hatched squares surrounded by beading and alternating with scrolls. Other lamps have oak-leaf wreaths with continuous stems crossed at the buts; others, oak branches, natural in treatment; another, sinuous grape-stems with leaves; another, a dove bearing a branch with pointed and channelled leaves, — all utterly un-Greek in treatment. Further, there are some lamps of ungraceful design, but exquisite workmanship (one is figured in Isaac Hall's "Cyprione Inscriptions"), with a herring-bone pattern encircling them, and vine wreaths, some with grapes in bunches, and some with a sort of forget-me-not flower. Nothing could be more like early Romanesque work.

The metal-work affords the most valuable part of our evidence. The patterns and styles in the gold articles are many, but there are few of the many that do not find their counterpart in the metal and stone decoration of Byzantium. Would you see a "St. Andrew's cross with foliated ends contained in a circle"? Look at the perfect Romanesque pattern repeated on each of the numerous thin gold plates, about an inch and a quarter in diameter, that went to form the mortuary necklace of a Phœnicio-Cypriote king of earliest days. And look from it to the gold cross of Charlemagne's time, shown in the Castellani collection, or compare it with the cross-shaped designs in Owen Jones's Byzantine and Romanesque pages. The resemblance amounts to identity of style. Then we find a gold ring, its pattern having been originally filled in with enamel, with beaded edges, which is but a sample of many similar articles that are duplicated in Byzantine jewelry. A reliquary of this latter style, for example, is depicted in the little South Kensington pamphlet on "Enamels." The crucifix is, of course, a new element, but the decorative parts proper might have been designed in Cyprus.

The curious sarcophagus, the lid of which is engraved on page 267 of "Cyprus," is not exhibited in the museum, and the engravings are sometimes so inaccurate that we can hardly trust to this one to give us the exact value of the original. The *stele*, at page 117, are certainly suggestive of later work, — perhaps of the Byzantine block above the capital.

One more fragment of presumptive evidence as to the connection of primitive Semitic art with the pre-Byzantine forms of the early Christian centuries: In De Vogüé's "Central Syria" I had noticed some time ago certain peculiar forms of architectural decoration. Broad, deeply channelled, but plain mouldings frame the top and sides of the windows, and continue across at the bottom from one window to another. Similar mouldings encircle the doors, and at the ends of each row of windows and the bottom of the door-jambs, the lines curl outward, returning to meet their own perpendicular lines in a sort of volute. The effect is very unfortunate, especially on the larger scale applied to the doors, for the framework of the apertures appears to rest on these soft, curled-up volutes. It can only have been a decorative motive applied thus semi-constructively by hands that were feeling about in the uncertainties of a growing style. Believing this, I noted it for future comparison. The identical pattern I afterwards found to exist in color on many of the early Phœnicio-Cypriote vases.

It is useless to multiply references, for without illustrations the assertion that a dozen examples exist is no more convincing than the claim to one. Only, if it be allowed that in General di Cesnola's pages there are shown at least the traces of such a style as we have been seeking, I can safely affirm that an examination of the collection itself will discover such traces in a hundred-fold greater abundance and clearness.

M. G. v. R.

[1] Cyprus: its Cities, Tombs, and Temples.

[2] Grammar of Ornament.

THE ILLUSTRATIONS.

THE BISHOP CUMMINGS MEMORIAL CHURCH, BALTIMORE, MD. MR. CHARLES E. CARSKIE, ARCHITECT.

This church is now being built on a very good site, corner of Carrollton Avenue and Lanvale Street, facing La Fayette Square. The exterior walls are to be of blue gneiss relieved with red and yellow sandstone, the shafts of columns being of polished red granite. The intention is to face the interior of the walls with bricks, with caps, corbels, and mouldings of sandstone.

STUDY IN PERSPECTIVE. — PLATES X. AND XI.

See "Paper on Perspectives," in this number.

DWELLING HOUSE IN NEW YORK. MR. R. M. HUNT, ARCHITECT.

This house is, we believe, situated on Thirty-eighth Street.

PAPERS ON PERSPECTIVE.

XI. THE PERSPECTIVE OF CIRCLES.

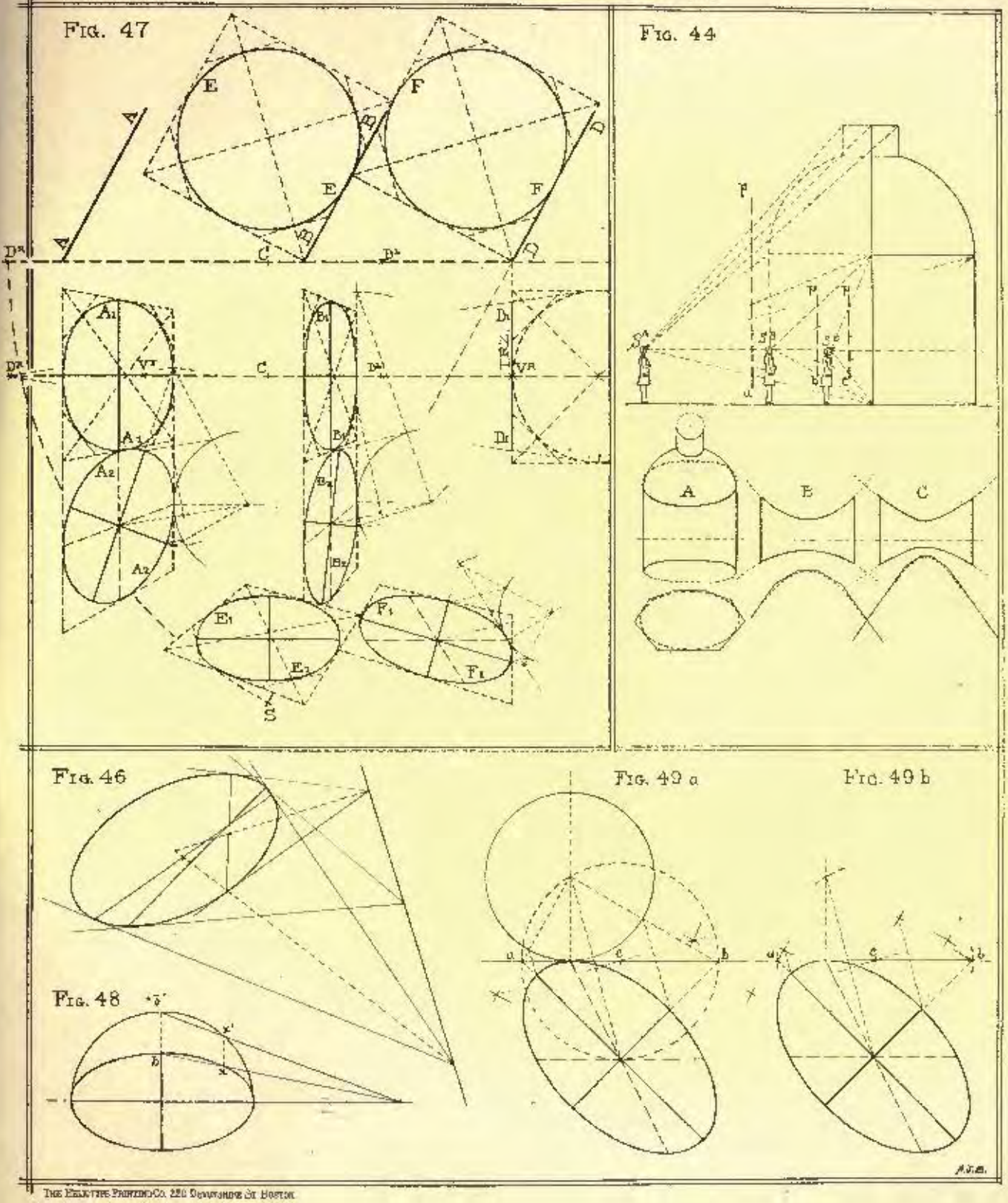
In the ten preceding papers we have considered all the principal problems of plane perspective embraced in our scheme. That is to say, we have shown how to obtain, upon a plane surface, the perspective representation of a straight line; whatever the position of the surface, and whatever the position of the spectator, we have shown how to obtain the position, magnitude, and direction of the representation of a line, when the position, magnitude, and direction of the line itself are known. The problems of shadows and of reflections have also been fully discussed, so far as concerns plane surfaces. Throughout the whole investigation it has been shown that the problem of the line includes the problems of plane and solid figures and of the point. In every case the vanishing point of every line and the vanishing trace of every plane has been ascertained, the solution being considered incomplete until this was accomplished.

219. The only lines included in this survey have accordingly been right lines, and the only plane or solid figures have been such as are bounded by right lines. Any other line or outline in perspective, as elsewhere in geometry, must in general be treated as a series of points, the perspective representation of each point being obtained separately. But to this rule the circle, here as elsewhere, constitutes an exception, its exceptional importance making it worth while to give it special consideration, while its peculiar geometrical properties render the investigation exceptionally simple and easy.

220. We shall find also that the study of the circle in perspective, and of its derivatives, the cylinder and the sphere, introduces a new set of most interesting phenomena, the investigation of which will, in a subsequent paper, lead to theoretical and practical conclusions of the first importance.

221. The perspective representation of a circle will obviously be the line in which the plane of the picture intersects a cone of rays of which the vertex is in the eye of the spectator, at the station point, and the base is the circle itself. The theory of conic sections establishes the fact that this line of intersection will be a circle, ellipse, parabola, or hyperbola, according to the angle at which the plane of the picture cuts the cone of the rays, and this whether the

PLATE X. THE PERSPECTIVE OF CIRCLES.



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axis of the cone be at right angles to the circle or inclined to it. In other words, the cross-section of the cone perpendicular to its axis may be either a circle or an ellipse. If the second plane is parallel to the base, or equally inclined to the axis in a contrary direction, making what is called a *sub-contrary* section, the perspective will be similar in shape, though not of course in size, to its original.

222. This is illustrated in Figs. 44 and 45, Plate X., and also by the two figures 50 and 51, in Plate XI., all of which show how horizontal circles, whether below or above the eye, will appear when viewed from different positions.

In Fig. 44 the spectator is shown as regarding the circular room on the right from three different positions. At S^A he is outside the room; the plane of the picture *pa* cuts completely across the cones of rays, and the sections are ellipses, as shown at A, below. At S^B he is just upon the edge of the circle; the plane of the picture *pb* cuts the cones in a direction parallel to one side, and the sections are parabolas, as seen below at B. At S^C the spectator is fairly within the circle, and the intersection of the vertical plane *pc* with the cones of rays gives hyperbolas, as at C. Figs. 45, 50, and 51, which are reproductions of some old engravings of circular halls in the Vatican Palace, excellently illustrate these elliptical, parabolic, and hyperbolic lines: the first being drawn, presumably with a *camera lucida*, from a point outside the circle; the second, from a point just on the edge of the room; the third, from a point within it.

223. Fig. 44 also illustrates the case in which the cone of rays is intersected by the plane of the picture in such a way as to give a sub-contrary section. The small horizontal circle forming the *eye* of the dome is the base of a cone of rays which is cut by the plane *ap*, at an angle with the axis of the cone equal to that made by the circle itself, but taken in a contrary direction. Both are obviously angles of 45°. The perspective of the circle is accordingly a circle (221), as is shown below. In Fig. 45, also, the perspective of the circle at the top of the dome is almost exactly circular.

224. In general, of course, the station point is outside the circle to be represented, so that practically the problem of putting a circle into perspective is this: to find the ellipse which represents it.

225. The simplest and generally the most efficient way to do this is to suppose a square or octagon to be circumscribed about the given circle, at any angle that may be most convenient. The centres of these sides give of course four or eight points of the required ellipse. As the direction of the sides gives the direction of the ellipse at these points, it can easily be drawn with sufficient accuracy for practical purposes. If greater accuracy is required the number of sides of the circumscribing polygon can be increased.

This is illustrated in Fig. 47.

226. But in order to draw an ellipse with precision it is necessary to find its centre, and the direction and length of its principal diameters or axes.

It is obvious from Figs. 44 and 45 that the perspective of the centre of a circle does not coincide with the middle point of the ellipse, as indeed it cannot, since the farther half of a circle must appear smaller than the nearer half, and its radii shorter. Neither do the extreme points of the ellipse represent the extreme points of the circle; the highest point in the perspective of an arch, for example, not being the perspective of the highest point in the arch, but of a lower point nearer the spectator. In fact, although a circle put into perspective appears as an ellipse, the diameters of the circle do not become diameters of the ellipse, but chords, which intersect at a point situated beyond the centre. On the other hand, the diameters of the ellipse, meeting and intersecting at its centre, are the perspectives of chords of the circle, which meet and intersect at a point within the circle nearer to the spectator than its centre, if the arch is above the eye, farther from him if it is below. The tangents at the extremities of each diameter of the circle are parallel; but their perspectives of course converge to a vanishing point; and since, for each circle, all these tangents lie in the same plane, these vanishing points all lie in the same straight line, which is the trace or horizon of that plane.

227. These phenomena afford a curious illustration of certain geometrical properties of the ellipse, which perhaps have no other illustration in nature. It has long been known to geometers that if a point be taken at random anywhere within a circle or an ellipse, and chords be drawn through that point, then the tangents drawn from the extremities of each chord will have their point of intersection upon a right line. This line is called a *polar line*, the point assumed being called a *pole*. As a mere geometrical proposition this seems to have no special significance; but the phenomena of perspective give it meaning. For a circle seen in perspective becomes an ellipse, its centre a pole, its diameters chords, and the polar line is the horizon upon which meet the tangents drawn from the extremities of its diameters.

228. Fig. 46 exhibits these relations, and illustrates also the further proposition, which, however, does not seem to admit of similar interpretation, that if lines are drawn from the points where the tangents meet through the middle of the chords they will pass through the centre of the ellipse. This property we shall find a use for presently.

Although in Fig. 44, A, the small vertical circle is the perspective of the small horizontal circle at the top of the dome, so that when seen from the station point S^A the two circles seem to coincide, yet their centres do not coincide, and neither of them coincides with the axis of the cone. The centre of each circle appears as a pole of the other. If the cone be cut by a plane at right angles with its axis, the section will be an ellipse, of which the axis of the cone will give the centre, and of which the centre of the upper circle will be a pole situated just below the axis, and the centre of the lower circle will be another pole just above it.

229. It will be noticed in the figures already given, and also in Fig. 47, that the vertical circles whose centres are on the Horizon, and the horizontal circles whose centres are exactly above or below the centre of the picture, C, lie symmetrically on the paper; that is to say, their principal diameters, their major and minor axes, are vertical and horizontal, while other ellipses have their axes more or less inclined.

Another and more comprehensive statement of this phenomenon is this: that if a line drawn through the centre of a circle normal to its plane, like the axle of a wheel, passes through the centre of the picture, C, the principal axes of the ellipse that represents the circle will be parallel to and at right angles to this line. Other circles, which do not, as it were, *face* the centre C, will be projected in ellipses the direction of whose axes it is more difficult to determine.

Fig. 47 shows a number of circles, three of which, A A, B B, and D D, are vertical, and accordingly appear in plan as right lines, and two, E E and F F, are horizontal. These appear in perspective at A^1 A^1, B^1 B^1, D^1 D^1, E E^1, and F^1 F^1, respectively. In all of these except the last, one of the principal axes passes through the centre C. In F^1 F^1, and also in the circles A^2 A^2 and B^2 B^2, the position of the principal axes is, so to speak, accidental.

230. Let us first take the case of the ellipses which represent circles that *do* face the centre C, and which accordingly lie symmetrically about a normal line joining this point with the perspective of their centres. This line will of course also pass through the centre of the ellipse, as in A^1 A^1, B^1 B^1, and E^1 E^1, Fig. 47.

231. If as in A A and B B two of the sides of the circumscribing square or octagon are parallel to the plane of the picture, and their perspectives consequently parallel to each other and perpendicular to the normal line, the line joining their middle points will be the minor axis of the ellipse; the major axis will cross it at its middle point, and it will only remain to ascertain the length of this major axis.

232. Fig. 47 shows how this is done. Let A A, B B, and D D, in the plan, be three parallel and similar circles, all touching the plane of the picture, and the last, as appears from the perspective below, standing edgewise to the spectator at S. If the space between them were filled up with other such circles they would all together constitute an elliptical cylinder, the apparent vertical dimension of which would be the apparent height of each of the circles and of the major axis of the ellipses that represent them. Now let the plane containing the circle D D and the station point S be revolved into the plane of the picture around the vertical line T R Z, in which the two planes intersect. S will of course fall at the point of distance D^n; the circle D D will appear of its true shape and size; lines drawn from D^n tangent to the circle D D thus revolved will determine the highest and lowest points visible from S, and the points where these lines cut the line T R Z will show the perspective of these points on the plane of the picture, and fix the apparent height of D D. The circles B B and A A will appear to be of the same height as D D, and D^1 D^1 will be the length of the major axes of the ellipses that represent them.

233. When, as in the case of the circle E E, the tangent lines are not parallel to the picture, the square or octagon that encloses the circle being in angular perspective, instead of being in parallel perspective as in the previous instance, the centre of the ellipse must be obtained as above explained (228), by bisecting two of the chords, and drawing lines from the vanishing points of their tangents. The principal axes of the ellipse may then be drawn, one towards the centre C, and the other parallel to the picture, that is to say, parallel to the horizon of the plane in which the circle lies. The length of the latter, or major axis, may then be found by direct projection, as in the figure.

234. To find the length of the minor axis, the major axis and one point of the ellipse being given, it is only necessary to employ the usual device, shown in Fig. 48, founded upon the proposition that if a semicircle be erected on the major axis of an ellipse the distance of the different points of the ellipse from this axis will be proportional to that of the corresponding points of the semicircle. Thus in the figure, one point *x* being given on the ellipse, and *x'* and *b'* obtained on the circle, the point *b* at the extremity of the minor axis is easily found, since the chords *bx* and *b'x'* meet on the line of the axis prolonged.

235. When the ellipse does not lie opposite the centre C, as is the case with F^1 F^1, and with A^2 A^2 and B^2 B^2, in Fig. 47, the normals drawn through the centres of these circles not passing across the centre of the picture (229), the only way to obtain the principal diameters or axes is first to obtain a pair of *conjugate* diameters. Conjugate diameters are diameters each of which is parallel to the tangents drawn through the extremities of the other. The axes are that pair of conjugate diameters which are at right angles with each

other; and one is always the longest diameter that can be drawn in a given ellipse, and the other the shortest.

236. The quickest way to obtain a pair of conjugate diameters in oblique ellipses such as A^2 A^2, B^2 B^2, and F^1 F^1 is to construct first such horizontal and vertical ellipses as A^1 A^1, B^1 B^1, and E^1 E^1, respectively, opposite the centre, and to obtain their principal axes as just described. If now the centre of each oblique ellipse is found, as above (228), and lines passed through it perspectively equal and parallel to these principal diameters, they will be conjugate diameters of the oblique ellipses. They will not be at right angles, but each will be parallel to the tangents drawn at the extremities of the other; one will be parallel to the plane of the picture and the other perpendicular to it, and directed to the centre C.

237. Fig. 47 also exhibits, in the case of F^1 F^1 and of A^2 A^2 and B^2 B^2, the geometrical operation by which, when an ellipse is given by two conjugate diameters, the principal axes may be obtained.

238. Fig. 49, *a*, shows this ingenious device more in detail. It is called the Method of Shadows, the ellipse being regarded as the shadow or projection of a circle. The process is this:—

A tangent being drawn at the extremity of one diameter parallel to its conjugate, a circle is erected also tangent at the same point, of such size that the ellipse might be its shadow. The shadow of every diameter of the circle will be a diameter of the ellipse, and the shadows of any two diameters of the circle which are at right angles with each other will be conjugate diameters of the ellipse, since the tangent at the extremity of one will be parallel to the other. The given conjugates of the ellipse are shadows of those diameters of the circle which are perpendicular to and parallel with the tangent line common to both circle and ellipse. Since the shadow of the diameter parallel to the tangent is also parallel to it, that line and its shadow are parallel to each other and must be of the same length. This fixes the size of the circle, the distance of whose centre from the end of one diameter is equal to half the length of its conjugate.

239. It now only remains to find in this circle a pair of diameters at right angles to each other whose shadows will also be at right angles. But since it is plain that if these diameters are prolonged till they reach the tangent line their shadows will also be prolonged, and will reach the tangent line at the same points, the problem becomes a very simple one. It is only necessary to find two points on the tangent line which make right-angled triangles both with the centre of the circle and with the centre of the ellipse; that is to say, two points such that the portion of the tangent lying between them shall be the common diameter of two semicircles passing respectively through these two centres. The common centre of these semicircles must be a point on the tangent line equidistant from the two centres; a point easily found by erecting a perpendicular upon the middle of the line connecting them, as is done in the figure. Semicircles struck from this point *c* as a centre, with a radius equal to its distance from the centre of the circle or of the ellipse, give the points *a* and *b*, through which diameters can be drawn in the circle whose shadows, drawn through the same points to the centre of the ellipse, are axes or principal diameters of the ellipse, both sets of diameters making right angles with each other.

240. As the centre of the ellipse is the shadow of the centre of the circle, the line that joins these centres may be considered to give the direction of the light, and lines drawn parallel to it through the extremities of the diameters of the circle will give the extremities of the corresponding diameters of the ellipse, or the length of the axes.

241. This operation, though long in the description, is simple in practice, and requires very few constructive lines, as is seen in Fig. 49, *b*, in which the operation just described is repeated with no more construction lines than are necessary.

This method is used, as has been said, in finding the axes of A^2 A^2, B^2 B^2, and F^1 F^1, and all the necessary construction lines are given.

242. The three figures 45, 50, and 51 are greatly reduced in size, and the station point accordingly brought nearer the surface of the paper than it is easy for the spectator to get. The drawings accordingly appear considerably distorted. These distortions will form the subject of the next paper.

THE FRENCH EXHIBITION.

II.

The great Exhibition of Paris is by no means confined to the contents of the Exhibition Palace proper. Vast as this structure is, with annexes to be measured by the furlong, which line the left bank of the Seine, there is a large addition on the right bank. It is only a complement of the great achievement of the year, but it will perhaps prove to be the greater attraction of the two. If a happy situation, an effective arrangement, and the choicest display do not establish that claim, it will be because the crowd of sight-seers prefer a garish collection of modern wares to works of older character and higher merit.

This second "palace" is built of solid stone, and is permanently added to the possessions of Paris. If such enormous sums are to be spent on a great national gala, lasting only for six months, it is certainly good policy to get some permanent good out of it. If the "happy influence of exhibitions" is a matter open to grave question, a fine building or a new quarter for the capital is an advantage about which there can be no question. An equivalent gain came to us from the great glass conservatory of Hyde Park. That structure was modest. It gave the utmost accommodation conceivable in a given space. It was nothing to what is to be seen in Paris, yet it was by no means small, measuring as many feet in length as the years that marked its date,—1851 or thereabouts. It was of manageable size, and perhaps gave us quite as much walking as we ever want to accomplish on such occasions. The result was that it left us, what no other such exhibition has left our own or any other nation, a handsome balance in cash. The world was at peace, and the times were good. Even had they been bad the expenses would probably have been well covered. As it was, there remained £150,000 or more for the commissioners to dispose of. Of the Horticultural Gardens it is perhaps as well not to speak; but a great London estate, wide roads, and a number of other advantages, much needed in this metropolis, owe their existence to that fund. If we look at the quadrangle of the South Kensington Museum, a dismal set of decorations representing the exhibition and the commissioners remind us that a first impulse was given to the riches of the museum collections from this same source. Nor is this fund by any means yet exhausted. It is to be regretted that nothing worthy of the immense cost incurred in 1862 remains to us. Efforts were made to induce the legislature to preserve the hideous mass of stock brickwork and the dumpy towers that gave entrance to the galleries in Cromwell road; but the ugliness of the building proved its condemnation. The walls were pulled down and the towers blown up by the royal engineers. The great Crimean General Todleben witnessed the last operation, and learnt how little powder is requisite to get rid of an exhibition.

"They order these matters better in France." A handsome building remains in the Champs Elysées from the year 1855, large enough for exhibitions of every kind, including just now a "concours hippique,"—in homely English, a horse show. The theatre and galleries of the Trocadéro will be a far more ambitious monument, whether equally serviceable in ordinary times or not. The Superior Commission for International Exhibitions determined to exhaust the inventive genius of French architects in procuring the best and fullest collection of notions attainable regarding their future show-room. Notice was given for a competition of designs; and this notice produced ninety-four different plans. None answered the requirements of the occasion; nor was any one deemed worthy either of the first prize or of the second. A dozen were selected, and their authors compensated by money awards; while from this set of proposals were gathered the parts, proportions, arrangements, and decorations of the various constructions since carried into effect. Some projects were wild enough. Two of them suggested the Bois de Boulogne as a site; one the race-course of Longchamp; others preferred the wood of Vincennes. One adventurous artist was for closing in the court of the Louvre and the Place du Carrousel, connecting it by covered corridors with the terraces of the Tuileries gardens, and thence, by two suspension bridges passing over the Place de la Concorde, with the Champs Elysées, the whole of which space was to be covered in. The time-honored garden itself was to be wholly renewed, the Seine to be crossed by arches, and more space over the river covered in than we have courage to describe,—an embarrassment of riches with a vengeance. The connection of the two sides lying right and left of the river was proposed by the officials composing this superior council, at the suggestion, we believe, of M. du Sommerard, the director of the Musée de Cluny. The proposal went no further than to place a temporary building on the right bank, as on the left; but an arrangement has been made by the treasury or the government with the municipality of Paris, and this part of the Exhibition is massively constructed in the beautiful white stone of which Paris is built. The total estimate for the expenses of the Exhibition was £1,400,000, with an excess of £360,000 for the Trocadéro. But, as it is now built, a much larger sum must have been spent. The Trocadéro is a hill rising rather abruptly from the bank of the river, like the height crowned by Windsor Castle. It was ascended by a broad flight of steps from the quay, and it received its name from a position near Cadiz stormed by French troops in 1823. From the summit there is a noble view of Paris, the river, and the surrounding country, dominated westward by the frowning walls and batteries of Mont Valérien. During the siege of the Commune in 1871, a formidable battery was placed there by the besieged, and it had to be stormed and taken in a bloody encounter. Heavy guns in such a place held every tower and dome of Paris at their mercy. The space now taken up by the galleries corresponds in width, or appears to correspond, with the Champ de Mars. Between the two runs the river, which is spanned by the bridge of Jena. Here, too, we pass across historic arches, for the bridge narrowly escaped blowing up by the Prussians during the occupation of 1815. It bore an unfortunate name, but it was saved by the Duke of Wellington. The bridge itself, though of good breadth, was not wide enough for what is now required, and a floor has been laid on iron joists from one parapet to the other. By this means the level of the bridge is raised to that of the made ground in front of the two Exhibitions, and the floor is carried twelve or thirteen feet out on each side, in addition to the original width. Between the new floor and the old roadway are laid the large iron pipes required for the

numerous fountains in the surrounding grounds, and for the supply of boiler houses and other requirements of the Exhibition proper. The flight of broad steps under the hill has been removed, the ground is carried down by various inclines, up which pass broad drives and walks, and the whole space is turned into a park, sown with grass and planted with trees and shrubs. But the great sight is the hall of the Trocadéro itself. A vast semicircle starts from the edge of the hill, bringing the two extremities well down the slope, where they end in square towers or "pavilions." From point to point the diameter reaches to some twelve hundred feet. Round the inner circuit is carried a gallery or colonnade. It rests on substructions, and is roofed over with Spanish tiling. The walls behind the pillars are red, and from column to column runs a balustrade of light red terra-cotta. This colonnade struck us as the most pleasing thing about the composition. In the centre of this long space the "Palace" is constructed. It is circular, and contains an amphitheatre with galleries round it. The hall is about thirty feet less in each dimension than the Albert Hall, and it is said to be perfection as to hearing. Two great square halls flank this central one, and these give access to the picture-galleries, which lie behind, and rise above the outer colonnades. The theatre is surrounded externally by two lofty galleries, the upper one arched. These galleries carry the circle conspicuously out on the face of the hill, and give a kind of shadowy impression of a vast cathedral apse with open arches round it. As this colonnade projects into falling ground, it is placed on massive substructions of stone-work. From the centre a projecting portico is carried. It supports colossal figures representing the different races of mankind, and covers a grotto or tunnel looking like the inlet to the bowels of a mountain, through which one might reasonably expect the issue of a great underground river. In fact, this is where the water does begin. A fountain of great water capacity flows from the top of this construction, falls over the arch, and thence to a series of broad basins flanked by narrower divisions containing bronze fountains. So it falls from one to another in a series of reservoirs, such as visitors to Paris may remember to have seen at St. Cloud.

Nor is the element of height, so well understood by French architects of all ages, neglected; the core of the round building is raised above the tall arches of the ambulatory. It is lighted by wide windows filled with ungainly tracery, and the intervening piers are topped by square machicolated tower-shaped masses of stone-work. These details are not agreeable; but the proportion and arrangement may be alleged in extenuation. Two lofty square towers are carried from the centre of this mass to a height of over three hundred feet, one on one side of the theatre and one on the other. These are crowned with battlements resting on deep machicolations and capped by covered canopies. Lifts are arranged inside, and visitors can be whisked up into the clouds, and will see things unimaginable by old-fashioned travellers. We must hope that despairing love and disappointed ambition may not revive a mania which in France has been too often put to terrible proof by such suggestive opportunities for a rash leap.

This range of buildings, seen from the terrace of the iron exhibition, half a mile away, will impress all admirers of bigness. Great fault has been found with the architecture, which is of no style, and borrows from half a dozen. The colonnades are Italian, the towers half Moorish, half Florentine, the window tracery of the heaviest Transition kind. It is called an adaptation of Oriental, and there are many varieties of Oriental architecture. The general disposition of the main block suggests that of some of the many-towered Rhenish churches. But the whole result is stamped with enterprise. There have been two architects, MM. Davioud and Bordais. One has perhaps given shape to the composition, the other filled in the detail. If these gentlemen mean to propose to us a new style of architecture, we trust they will meet with disappointment; but the architects have no doubt executed a clever and bold stroke of scene-painting developed into real construction. The site adds not a little to its imposing presence. The admirers of the composition will very likely say that the ranges of building are such as they have seen in Martin's pictures, — the council chamber, for instance, of the fallen angels, or the hanging gardens and halls of Babylon. At a distance where the towers only are visible, ugliness emphatically asserts its rights.

In the theatre all the great ceremonies of the Exhibition are to take place, — the distribution of prizes and medals, and musical concerts of many kinds. The different nationalities have arranged, or are expected to arrange, representations of their national musical compositions. Mr. Arthur Sullivan will be the leader of the English performances. How funds are to be provided, and how far the expenses of these concerts are to fall upon the resources of the different commissions, is not told. Our own representatives are passing poor on fifty thousand pounds, for much has to be done, and from such penury no very wide margin is to be expected for pleasant sallies of this description. Some musical societies will give their services gratuitously, — Leslie's choir, for instance. Still we must hope that if important performances are projected the best professional skill may be secured by some means or other. Another use of the theatre is the holding of "conferences" on various subjects connected with arts, health of towns, sciences and 'ologies, one knows not what. If this scheme is carried out, there will be curious things to be heard. As each professor may hold forth on his own theme and in his proper tongue, the audiences will perhaps be often rather limited. In sober earnest, it is to be regretted that strangers collected from the *orbis terrarum*, many of them bringing objects or plans well worth more attention than can be bestowed on all of them together, should be hustled as all must be. The most interesting of all the exhibitors will be inventors and enthusiasts. Such men have usually worked by a spark of strange light which has been wholly their own. Whether what they offer to us is measurable by the rules of reason, possible, or endurable if possible, there is at all events something in such men well worthy of a hearing. Under the glare of glass and iron, flags and stripes, and the jangle of a hundred thousand tongues, what can be listened to that requires patience or attention? Mixed juries, again, are not tribunals for judging brains. The things to be seen are too many. The largest objects, the costliest productions, perhaps the pictures and statues which least call for care and reflection on the part of the observer, — these will win the day. Indeed, when actual medals and rewards are to be distributed, considerations political, international, or commercial — in a word interested — may often help to decide claims which are professedly tried with an impartiality inflexible as fate. Good as the idea of holding international scientific conferences may be in the abstract, it must be doubtful whether much will come of it while so noisy and fatiguing an atmosphere keeps natives and strangers at fever heat.

The gardens of the Trocadéro will be a real joy to the wearied wanderer in Vanity Fair. Here also he may turn into various buildings, some of considerable size, for which there has been no room found round the main structure of the day. The French have an Algerian house of large size, enclosing a court and dominated by a tower, all the walls of dead cold white. It contains what Algiers has contributed of an attractive kind, and rivals in some sort the admirable show we make with our Indian jewels, shawls, carpets, and fine wares of every kind in the grand vestibule. Then the Japanese have an admirably arranged out-building where the national manners and daily life may be studied in action. There are other dependencies of different national sections here. Of the much-wanted eating-places two are provided in the middle of the grounds. The happy traveller who secures a table at either with something on it may cast his gaze over a lovely landscape and enjoy that element of god-like feasting, the sight of good men struggling with adversity below. Anyhow, the gardens, the shrubberies, and the grass (when it is grown) are real charms in the middle of such a collection of men and things, — the men so loud, and the things so heaped together. On a sort of no man's land, down by the level of the river, is the exhibition of boats and things marine. All these curiosities are but transitory, and happily they will disappear in six months; but the Trocadéro will remain as a permanent acquisition to the capital. No small praise is due to the republican municipality which has known how to turn a momentary fit of extravagance to such good account. — *The Saturday Review.*

THE PRIZES OF THE BOSTON SOCIETY OF ARCHITECTS.

THE committee of the Boston Chapter of the American Institute of Architects has awarded the annual prizes of the chapter for the best work of the year in the Department of Architecture of the Massachusetts Institute of Technology, as follows: a first prize to Alfred S. Higgins, of Boston; a second prize to A. W. Longfellow, Jr., of Portland, Me.; an honorable mention to George C. Grover, of Dedham.

Mr. Higgins is a graduate of the Institute, of the present year. Mr. Longfellow and Mr. Grover are special students in the department. The prizes are given in books, of the value of fifty dollars.

THE QUALIFYING OF ARCHITECTS.

NEW YORK, June 11, 1878.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — With regard to the qualifications of architects, permit me to make what would seem to be a practicable suggestion.

Let the Institute of Architects arrange to hold an examination annually, at such a season as shall appear to be most convenient. Let those who succeed in passing the examination receive diplomas, certifying the capability of the holder. The details of this plan might be arranged by the committee appointed to take charge of the matter. Thus, it might be advisable to hold examinations in various branches, in woolen, iron, and stone construction, and in other departments; but it would probably be better to confine the inquiry to such general principles as are necessary for all to know who desire to practice as architects. The examination might be either in writing, as supposed by one of your correspondents, or might consist of what, in schools of science, is called a *projet*, namely, a complete design for an appointed work, with drawings, descriptions, specifications, and estimates. As to design, any criterion in that would appear impossible for the present. Where men of eminence show such striking differences both in theory and in practice, any attempt to set up a standard in such matters would be vain. The advantages of this scheme are evident. The diplomas would be a recognition of merit where it existed, while it could not be inferred that those who were without this evidence were incapable. The profession generally, from whom, it has been said, much opposition would come, and particularly the Institute members, would have the honor and glory of granting their certificate, through their committee, to

future aspirants, while this position would in itself proclaim them as not requiring such evidence to support the testimony of their long practice and well-deserved success.

If this scheme should be found worthy of consideration, action cannot follow too soon. If it should be determined to hold an examination next winter, it is full time now to determine its method and scope.

Several months beforehand it should be announced, with careful mention of the ground that it will cover. Even if only two or three should avail themselves the first year of its privileges, no discouragement should be felt. Slow growth is often necessary for stability, and by the gradual adaptation to the general needs that experience would effect, we might yet see an extension of professional organization that would be a benefit to the community and a credit to its founders.

JOHN BEVERLEY ROBINSON.

NOTES AND CLIPPINGS.

MR. SCHLEICHER'S PUBLIC BUILDINGS BILL. — Mr. Schleicher closed as follows a speech made June 13th, in the House of Representatives, on his Public Buildings Bill, which we have before discussed (*American Architect*, No. 127). "The following facts are worthy of consideration: In the last ten years the annual appropriations for erecting public buildings have aggregated $43,536,005.86; adding to this ten years' rentals at the rate of $1,250,000, make an annual average expenditure of over $5,500,000. The adoption of the measures proposed by this bill would reduce this expense to $2,000,000, namely, $1,500,000 interest on forty millions of bonds, and about $500,000 for rents of small post offices and other buildings, in locations where the rents being paid are not sufficient to justify building. All the buildings now being erected, and hereafter every building which is begun, will be finished without interruption in as short a time as consistent with good construction and careful work."

BEDS OF CEMENT. — A company of New York city and Ulster County capitalists has been organized to work the cement beds and quarry located near the Orange and Ulster county line at Hampton, seven miles north of Newburg. The cement rock averages thirty feet in depth, and is classed by experts as "black and white Portland." The quarry is extensive, and will furnish the bulk of the stone for the Poughkeepsie bridge caissons.

THE FINANCIAL RESULT OF THE EXHIBITION. — The expenses of the French Exhibition will probably amount to 50,000,000 francs, and it is almost certain that the receipts cannot cover the expenditure. The commissioners, however, maintain that the deficit will be inconsiderable. They count upon a certain receipt of 34,000,000 francs, of which 14,000,000 will be from entrance tickets, and they believe that the sale of materials will realize 7,500,000 francs; they calculate that 28,000 tons of iron frames and girders will be disposed of, at an average of 20 centimes (4 cents) the kilogramme, making 5,600,000 francs, and that the cast-iron pillars, weighing 6,000 tons, at 16 centimes the kilogramme, will bring 900,000 francs; 7,000 stères of woodwork (the stere is a French measure of a little over 35 square feet), at 20 francs each, will give 140,000 francs; 40,000 metres of sheds, at 10 francs the metre, 400,000 francs; and if the remainder of the materials do not balance the account, the State can easily make up the deficit by a tax of some kind.

THE NATIONAL FAÇADES. — The Belgian façade is said to be the largest and best built, as well as the most costly façade (it is said to have cost $120,000) in the Rue des Nations in the Exhibition Building. It is a reproduction of the Hôtel de Ville at Bruges, which, though begun in 1377, is mainly of the sixteenth century.

The Portuguese façade is a reproduction in plaster-of-Paris of the famous porch of the Belem Monastery.

THE GERMAN EXHIBIT. — The Germans have in part made up for their churlishness in refusing to take part in the Exhibition, by sending a large number of works of art; among them are some ninety subjects submitted by Berlinese artists.

BELGIAN IRON. — The *Pall Mall Gazette* says that Belgian iron-masters are able to buy, and have bought, pig-iron in England, carry it to Belgium, work it, send it back to England, and deliver it in manufactured form, even in the iron-districts themselves, at a price below what it would cost English manufacturers to make it on the spot. The reasons adduced for this statement are the facts that owing to improved processes much coal is not needed, and that wages which were eleven francs in 1872 have fallen to four francs at the present time, and yet the men have not struck; hence the masters have been able to carry on their works without interruption, and can underbid English dealers, whose expenses are made heavy by the wages that fear of strikes compels them to pay their men. The reason that Belgian workmen do not strike is that if they do strike they must support themselves, for there are no poor-rates for them to fall back on. Moreover, the Government is very summary in its dealings with strikers, for, feeling that its first duty is to protect peaceful industry, it calls out troops at the first note of a disturbance, and quiet is restored at any price.

DECORATING ST. PAUL'S. — An effort is making to raise $200,000 for the decoration of St. Paul's Cathedral in London with mosaics, the designs for which have been entrusted to Mr. Leighton and Mr. Poynter.

A BALLAST HILL. — The local government board of Newcastle-on-Tyne has been memorialized to the effect that leave may be granted to build certain artisans' dwellings elsewhere than on Miller's Hill, for it appears that this hill, which is some fifty feet above the level of the streets, has been formed by ships' crews who have dumped there the sand, clay, or gravel which their vessels carried when they had come in ballast to that port in search of a cargo; and therefore the site could become suitable for building only by surrounding this artificial hill by a costly retaining-wall, or by entirely removing the hill.

THE STATUE OF VOLTAIRE. — M. Davioud, one of the architects of the Palace of the Trocadéro, has lately received rather a rebuff, in the resolution passed by the municipal council of the city of Paris, in the matter of condemning one of the fountains of his designing in order to provide a place for the new statue of Voltaire. One of the passages of the order was as follows: Considering that the fountain of the Château-d'Eau produces a bad effect, and that it is so defectively built as to require repeated and costly repairs, — *Resolved*, that the statue of Voltaire be erected in the Place Château-d'Eau on the site of the fountain, which shall be suppressed.

HUMORS OF RUSSIAN BRIDGE-BUILDING. — Much interest was felt, six months or so ago, in a pontoon-bridge which the Russians proposed to build over the Danube. Its novel feature was the employment of immense cylindrical floats of sheet iron, which were to carry the road, and were constructed on curious principles. The undertaking, however, was most certainly never achieved, and some inquisitive mind has hunted out these facts of its history, not as yet officially published. The cylinders were all made by Prussian iron-works on the Rhine, but never reached their destination, the seat of war. The Russian railroads found them too large to be readily transported. Nowhere were the roads, at that time in an especially disordered state, able to procure the cranes and derricks necessary for unloading and reloading these monsters. The cylinders were therefore divided into sections and placed on separate cars, which continued to block up the tracks, from last October until very recently. Many cars were scattered in Roumania, and *one hundred and twenty* loads found their way, in some wonderful manner, to Odessa. The impossibility of ever fitting together these separated and scattered pieces was evident, and every car bearing part or parts of an iron pontoon bridge has been, by an ukase, ordered back to Warsaw. The one hundred and twenty loads from Odessa had travelled more than sixteen hundred miles.

THE "PILE-BUILDING PERIOD" OF SWITZERLAND. — In the winter of 1853 it happened that the waters of the Lake of Zürich sank lower than they had ever been known to do before; and the people of Mieten, who had seized this opportunity of completing some buildings along the shore, made the discovery that here, too, there were numerous old sharpened stakes, as well as pottery and articles made of stone and bone. The news soon reached the ears of the scientific world, and much zeal was shown in exploring the bottom of this and the other lakes of Switzerland; and the result of these investigations was that much light was thrown upon the "Pile-building Period," as the German scientists have named it, an age which dates back more than 5,000 years before the dawn of history, and had until now been completely hidden from us. More and more discoveries were made. As soon as the dwellings of that time had been reconstructed, — by no means an arduous task, — the domestic utensils and hunting weapons, and the remains of plants and animals, all seemed to find their proper places. No doubt remained as to the manner of life led by these ancient people, and although we may have no positive assurance as to their name, we are able to divide the time of their existence into three well-defined ages, called respectively the Stone Age, Bronze Age, and Iron Age, according to the materials of which their weapons and implements were successively made. The Stone Age, of course, was the earliest; the Bronze Age showed some advance in civilization; and with the Iron Age we come to the times of the Romans. All the lakes have yielded more remains of the Stone Age than of either of the two others; but all three periods may be best studied at Neuchâtel. — *Exchange.*

A REMARKABLE NARROW-GAUGE RAILWAY. — The *Railway Age* says: One of the most remarkable examples of engineering enterprise and boldness is found in the narrow-gauge extension, just completed, of the Colorado Central Road from Black Hawk to Central. The distance between these two places is one mile; but to accomplish it the road has to climb an elevation of 353 feet, by a route 1½ miles in length. The undertaking was pronounced impracticable by many experienced engineers, but has been successfully accomplished by means of zigzagging switches, heavy rock cuts, some of them 50 feet deep, four bridges, numerous deep fills, one of 100 feet, and heavy masonry. The work, which is of the most substantial character, is said to have cost $16,000 per mile, or about $80,000. A standard-gauge road over this route would have cost vastly more if it could have been built at all, which is doubtful, — a very good illustration of some of the advantages of the narrow-gauge system for special localities.

SOIL POLLUTION. — It is stated that M. Smolensky, who has made many analyses of ground-air, has found that the carbonic acid in the ground-air of districts in which there are many cesspools is distinctly proportioned to the degree of pollution of the soil.

A WOOD STAIN. — The employment of alkaline manganates for imparting to light woods in furniture and floors an attractive, uniform, and durable walnut brown, is highly recommended by M. Viedt. The action depends upon the decomposition of salt in the pores of the wood, with the separation in them of very finely-divided brown hydrate peroxide of manganese, and an addition of magnesium sulphate to the solution is found to hasten the reaction. In practice the following method is said by the *Locomotive Gazette* to be successful: Equal parts of manganate of soda and crystallized Epsom salts are dissolved in twenty to thirty times the amount of water at about 144 degrees, and the planed wood is then brushed with the solution; the less the water employed the darker the stain, and the hotter the solution the deeper it will penetrate. When thoroughly dry, and after the operation has been repeated if necessary, the furniture is smoothed with oil, and finally polished, the appearance being then really beautiful. Before smoothing, however, a careful washing with hot water will have the effect to prevent the efflorescence of the sulphate of soda formed. In the treatment of floors, the solution may be employed boiling hot, and, if the shade produced is not dark enough, a second application of a less concentrated solution is made; after it is quite dry it is varnished with a perfectly colorless oil varnish. On account of the depth to which the coloring solution penetrates, a fresh application is not soon required.

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THE Secretary of the Interior has addressed to certain architects in various parts of the country an invitation to unite, under assumed signatures, in a competition of designs for the restoration or alteration of the Patent Office at Washington. Briefly stated, the scheme of this competition embraces, first, a project for the restoration of the building substantially according to its condition before the fire, referring, we suppose, to the designing of a new fire-proof roof; second, a project for the conversion of the model-rooms, lately occupying the upper story of the north and west wings, into offices, and the addition of a model-room above the offices, or over the entire building, so contrived, however, as not to change its present exterior aspect, although designs for an additional architectural story to the façades may be submitted if desired; and third, a project for a new *corps du batiment* uniting the centres of the north and south wings, with elevators, etc. Line drawings are required and perspective illustrations permitted. The drawings are to be submitted before July 20th, and a committee of "three skilled architects, to be appointed by the Secretary of the Interior," is to examine the plans and recommend to the Department the award of the six hundred dollars appropriated for this purpose by Congress in three prizes of three hundred, two hundred, and one hundred dollars. There is no assurance of the employment of any of the successful competitors to furnish detail working-drawings or to superintend the execution of the work as architects.

WE understand that the Secretary is already in receipt of numerous letters from the invited architects, declining to compete on the ground of insufficient compensation — a very natural attitude for the more respectable members of the profession to assume, and one consistent with the most approved ideas of practice, as it is evident that the competition implies a large aggregate of unremunerated professional labor, hardly justified perhaps even to the winner of the first prize, unless the winning of it implies more than is evident in the scheme of the competition. This proposition from the general government is remarkable, and in late years, at least, unprecedented. We are not informed why Congress selected this case of repairs and alterations as a fitting opportunity to try its first experiment in architectural competition, but it certainly seems to be an honest though in some respects an ill-considered scheme to appeal to the general profession for assistance in the decision of an unusual but apparently not a very difficult question of architectural design. The invitation, therefore, as it may carry with it results ultimately of great importance to the profession and serve as an illustration of the practicability of making use of competitions of designs for public buildings, as proposed, for example, in Mr. Schleicher's bill (*American Architect*, June —, 1878), is not to be lightly dismissed through a too scrupulous regard for customs devised and maintained to suit the exigencies of private practice. It is true that the precedent is dangerous in several respects, especially in the matter of inadequate awards, but if the response to the invitation proves to be one fertile in ingenious and profitable suggestions, the employment of the profession, by some process of selection, at least in the designing if not in the construction of the buildings of the general government, would seem to be more clearly assured than if architects, in this trial case, stood aloof, exacting better and more honorable conditions. Doubtless many architects of good repute will consider it politic, therefore, to show what the profession can do in such an emergency as this and, after such showing, to demand in future cases its proper service and its proper pecuniary recognition. It is only through competitions of some sort that architects can ever have due share in the public works; it is worthy of consideration, therefore, whether the establishment of a policy of competitions should not be encouraged by the profession even at the expense of some sacrifices in the preliminary experiments. Certainly the improvement of the national architecture by any proper means is an aim which may well demand the patriotic sympathy of the profession.

THE Department of Buildings in the city of New York seems now to be "under fire." An article in the New York *Times* of the 17th enters into an examination of the conduct of affairs in this Department while under the charge of the present Superintendent, Walter W. Adams, and, with much circumstance of facts and figures, charges him with submitting this important part of the public service to the baleful patronage of Tammany Hall, by increasing his force and his pay-roll from time to time in accordance with the needs of politics, and by subdividing his office into three Bureaus, one entitled the "Bureau of Inspection of Buildings," another, the "Bureau of Violations and Applications," and the third known as the "Bureau of Fire Escapes and Iron Works," each requiring an extensive apparatus of clerks and inspectors. The article charges that the appointment of these inspectors is in the interests of party and not of sound building; that they are not "practical architects, house carpenters, or masons," who have "passed an examination before the Board of Examiners," as required by law, but politicians and the friends of politicians, and the expenses, under this system of reorganization, have increased three or four fold without a corresponding increase in the needs or efficiency of the Department. The specification of malfeasance with which the public is most immediately concerned and which most vitally affects the efficiency of the Department seems to be that referring to certain buildings now erecting in the upper part of the city, which are sixty-five feet deep and fifty-five feet high, and yet, contrary to law, are separated by party walls only eight inches thick; also drawing attention to "Hale's Building" in Thirty-sixth Street, which, sixty feet wide in front, forty-eight feet wide in rear, and eight stories high, is yet allowed to be built without the cross wall required by the act; and also to two theatres in the Bowery, lately built, which are stigmatized in general terms as "man traps."

THESE serious charges encounter a specious and prompt rebuttal in the New York *Evening Post* of the same date, inspired by the Superintendent himself. He is charged with raising the expenses of his office from $30,000 per annum in 1873, when he entered upon his duties, to $126,000 in 1874, $106,000 in 1875, $89,000 in 1876 and $91,000 in 1877. He maintains that the expenses for these years were respectively $114,000, $95,000, $75,000 and $75,000; and that to contrast these figures with the $30,000 appropriated in the last year of his predecessor's service is unjust, because, on account of "a contest" between said predecessor, Mr. James M. Macgregor, and the Comptroller, the appropriations for that year were reduced to an abnormal figure, a statement which seems to be sustained by the fact that the appropriations for the five previous years were respectively $60,300, $69,300, $136,000, $181,000 and $87,000. The Superintendent, in meeting the other charges in detail, enters into an explanation of his conduct of the office, maintaining that the variation in the number of his subordinates has been governed by the direct needs of the service, because of special general examinations, such as that of warehouses and storehouses; that his pay-roll contained names of men of both parties, and that the inspectors of fire-escapes were placed on his

pay-rolls as messengers (who by the law are not required to pass an examination), because men fit for this service could be obtained for one half the amount properly charged by skilled mechanics who are no better suited for this especial duty. The specific charges relating to alleged neglect in the supervision of certain buildings, as before noted, are explained by the statement that the plans for the buildings with eight-inch party walls, after having been rejected by the Department, were submitted by the owner to the Board of Examiners, — which is composed of the Superintendent himself, of ten members of the Mechanics' and Traders' Exchange, of one member of the Board of Underwriters and one member of the American Institute of Architects, — and that the Board, under the law, allowed the thin walls in this case, because the two buildings referred to were together not more than 25 feet wide and because a single building of this width can be legally constructed with only outside walls and wooden partitions. The case of Hale's Building, which was charged with being erected without cross walls, is explained by the fact that it is in reality two buildings separated by a brick wall from top to bottom, one building 66 feet wide extending from street to street being divided by a cross wall, the other 84 feet wide and only 41 feet deep having girders substituted for cross wall by especial permission of the Board on account of the comparative shallowness of the lot in this part. As to the theatres in the Bowery the Superintendent maintains that as the twelve-inch walls are enforced by buttresses 20 inches by 24 inches at intervals of ten feet, and as the proscenium arch is of brick and carried up to the roof, and as in one case there are three staircases inside and one outside, and as in the other the entire front is open for exit, and as both buildings are furnished with separate entrances to the dressing-rooms, the requirements of safe construction are fulfilled according to the definitions of the law. This statement is followed in the *Evening Post* of the 21st inst. by a personal rejoinder from Mr. Macgregor, the former incumbent of the office, denying many of the facts, figures, and arguments stated in defence, but leaving untouched several charges which the present official appears to have refuted in his letter, notably the specific charges relating to the buildings.

On the whole it is a very pretty quarrel as it stands, and doubtless there will be much more of it. Apparently, however, there is an element of malice in the charge against Mr. Adams; but however this may be, the public safety, constantly imperilled by imperfect buildings and by minute evasions of the law, requires the Department of Buildings in every great city to be held to a very strict accountability, and it is better for this service to be stung to vigilance by a constant and jealous scrutiny of its details, even to the extent, we think, of occasional injustice and unreasonableness in the fault-finding, than to be lulled to carelessness and inefficiency by the appearance of public indifference. A municipal administration like that of Baltimore, which, as we have seen, needs the admonition of a few more fatal accidents from unrestrained habits of bad building, before it will accept the definitions and requirements of sound construction embodied in a law, slumbers while the enemy is at the gates. But a city which enjoys the protection of the necessary building laws and neglects to watch the administration thereof, and to perfect them by all necessary amendments, is also asleep, and, according to the doctrine of chances, the tragedy which will murder this sleep in either case is inevitable sooner or later. Therefore we cannot entirely condemn the spirit of criticism, even if harsh and over-strict, upon the administration of this essential part of the public service.

If, during the current year, there has been no one startling building accident which has caused great loss of life, there has been an unusual number of fatal accidents where the loss of life has not been great. These have been mainly preventable accidents. The latest fatality of this nature took place on Saturday last in a furniture warehouse in New York, where the falling of an iron girder in the seventh floor of the iron-fronted building, 190 Mott Street, precipitated upon the floor below four or five tons of broken material, and caused the death of one man. It speaks well for the strength of the building that the sixth floor withstood unharmed the shock of so heavy a falling mass. The fallen floor, like the others in the building, was a brick-arched floor, the arches resting on floor beams, which in turn were supported by iron girders twenty feet on centres. The manner in which the floor fell leads us to suspect that overloading was not the sole cause of the accident. It is said that that portion of the floor that did fall did not give way in one mass, and it is a supposable case that the brickwork of the arches had become so weakened by the vibration of the heavy machinery, which is said to cause oscillation throughout the whole building, that one of the least well-laid arches gave way; one arch gone the others would instantly follow, destroyed by their own thrust, and in this way some unsuspected strain may have been brought to bear on the girder and so have caused its fall. At present the only hypothesis advanced is that the floor was overloaded. In this event the accident was criminal, but can hardly be punished, for as was explained lately by our New York correspondent, the law that was framed for the purpose of preventing accidents from overloading, by making it compulsory on owners to post in plain sight a statement of the safe load that a floor can carry, has been rendered almost inoperative by the decision of the counsel of the Building Department, who rules that the storehouses contemplated in the law in question are only those where goods are stored in unbroken bulk.

At a Socialistic meeting last week in St. Louis, the following resolve was passed: "That we favor a system that will equalize the wages of all persons employed by the city of St. Louis, so that the men who work on the streets and public works generally shall be paid equal wages with the mayor or any other officer of the city." When the habits of the men who profess such doctrines are considered, the next resolution does not seem so absurd, declaring as it does that the bell-punch will "add immense burdens to the already overburdened industrious classes of society;" from which we are to infer that it is the industrious and sober man, and not the drinker, who has to pay scot. Those who have witnessed the magnetic power of an earnest and eloquent demagogue in the presence of such inflammable material cannot but fear that, if Kearney carries out his threat of making a starring tour through the East, he may obtain a dangerous following among scatter-brained enthusiasts, who, though perhaps few in number, are able when associated with the discontented and reckless to give much trouble. Congress, which has appointed a committee to consider, during the recess, these labor troubles and the causes of the present financial depression, has in intention acted wisely; but as these questions involve considerations which lie at the roots of society, — considerations which can be revealed only to statesmen and scholars, and are far too delicate for the coarser manipulations of party politicians, we cannot but fear that the new investigation will leave these dubious skies as lowering as ever.

If there are to be labor troubles in this country, indications seem to point to the far West as the place where they will first break out, for here, because of the competition of the Chinese, the grievance of the workingmen is as real as it is anywhere, while the laws of society are less strictly enforced. The hoodlum element is a large factor on the Pacific coast, and the army, the moral effect of which in the face of a popular outbreak is even greater than its physical strength, can, according to the recent act of Congress, no longer be used as a *posse comitatus* to assist in quelling disturbances, and if it could be thus used it seems likely to be so occupied with the Indians that it cannot be concentrated in a time of emergency. On Wednesday week an election was held in California to select delegates to a convention which is to be held for the purpose of revising the State Constitution, and the returns show how real is the strength of the Kearneyites, as the communists are there pretty generally called. In numbers the agitators are in the minority, but they were enabled to bring to the ballot-box a solid organized vote, which naturally prevailed over the six distinct tickets by which the great majority of the citizens had divided their strength. It is not surprising, therefore, that Kearney's followers carried San Francisco and some other places.

In a recent issue our Boston correspondent criticised the competitive plans for one portion of the proposed system of parks for that city. This system, as we have explained (*American Architect* for June 17, 1876), is to embrace several features, the most attractive of which is, perhaps, the water-park, which is to be laid out on the bank of Charles River, in the rear of the houses on the northerly side of Beacon Street. As originally proposed, this was to be made by building a new retaining-wall two hundred feet outside of the old wall, filling in the

space thus reclaimed, and laying it out with an avenue sixty feet wide and a bridle-path thirty feet wide, separated by trees and shrubbery, and with gardens and an esplanade outside of all. This, so far as it went, was good, but it was obviously not making the most of the great natural advantages of the situation. Fortunately, before anything has been done, the wastefulness of a half-way measure has been seen, and at the petition of the city of Boston the State Legislature has passed a resolution which allows the following modification of the scheme: The retaining-wall is to be built three hundred and twenty-five feet outside the present wall; and of this width the two hundred feet next the river will, as before, be appropriated to the driveway and water-park, while the remaining width will be occupied by a range of houses which is to be built on this new land, and which will form a fit architectural background to what is really a fine river front, and by a street which will separate them from the houses now backing on the river. It is to be expected that the present residents of the Beacon Street houses will strenuously oppose this annihilation of their most valued privilege, but we trust that the influence of a few may not prevail against the advantage of the many. The new intercepting sewer being laid under this new park will prevent any further pollution of the river water by inflowing sewage, and in view of this fact the Land Commissioners, with whom the matter rests, propose to remove, by dredging, the flats that now fill so much of the river basin abreast the city, and which at low tide are so fertile a source of noisome odors. The basin in this case will be filled at all tides with water, which will gradually become more and more pure as the new sewerage system allows the harbor water to become purer, and the river, then receiving only the pollution of the towns higher up stream, will once more be available for pleasure-boats and swimming-baths. One feature of the scheme, however, cannot but meet with disapproval, and that is the proposition to use the muck and sludge dredged from the river basin as a filling behind the wall. This is doubtless the cheapest and easiest way of getting rid of the stuff, but, for obvious reasons, it is not the wisest, from either a sanitary or financial point of view. People in these days will not build upon a foundation which is in any respect suspicious.

HOW WILL ELEVATED RAILWAYS AFFECT CITY STREETS?

It is too soon to judge clearly of the effects of the elevated railways on the streets on which they run, but there may be useful suggestions to be got by considering some of their obvious tendencies. The absolute depreciation or appreciation of abutting property will depend on the balance of various smaller results. Whether the ultimate value goes up or down, there will necessarily be changes in the use of the streets, and the final level at which it settles will depend in a great measure upon the address with which advantages and disadvantages are seized upon or parried by the abutting property owners.

Some of the effects are in the nature of things easy to see. Obstruction of the roadway of the streets is inevitable. This is a minimum in the narrower streets, where the elevated way covers the road from sidewalk to sidewalk, and the piers are set in the line of the curb-stones. It is greater in the wider streets, which it divides by a row, or two rows, of piers throughout their length. Added to this is a certain amount of annoyance from the noise and confusion of passing trains, the obstruction of light and air, the falling of cinders and of some rubbish, and a small — perhaps in the end very small — element of anxiety due to the increased chance of accident. These things might not tell for much, except by the actual obstruction of the roadway, in streets given up to heavy traffic, but they must in those which are used for retail shops and by private carriages. The same causes will naturally produce a like effect on foot-passengers, especially upon men and women engaged in shopping. The shops themselves must suffer correspondingly from increase of noise, loss of light, and the air of submersion which comes of having a roadway above them. Retail trade is confessedly coy, and to women especially, on whom it greatly depends, noise, cinders, and gloom are decided deterrents. Architecturally, the injury is serious. The elevated ways are now deformities, though this may be remedied when experience warrants making them permanent. But unless the streets are of very exceptional width their architecture is absolutely wiped out. No building can be seen from its own base, nor, with the railway in the air between, can one be seen from the roadway or the opposite sidewalk. No architectural effect is possible till the observer climbs to the second story of the houses.

The result of all these things is, especially in the narrow streets, that the roadway under the track assumes more or less the character of a tunnel, but noisy and dusty with the passing of trains on the trestle-work overhead; the sidewalks are, as it were, in trenches between a high viaduct on one hand and the lower stories of houses on the other; these lower stories, deprived of a part of their light and submerged below the level of the through-traffic, begin to seem like basements; light, cheerfulness, the sense of the open air, and architectural outlook are relegated to the upper stories of the houses.

These disadvantages must tell heavily against streets over which the elevated railways run, even though they may be countervailed more or less by the advantage of passengers brought into them. At the same time, if the railways really solve efficiently and conveniently the problem of quick transit they must be frankly accepted and made the best of. The public exigency on this point is imperative, in New York at least, and individual convenience must give way. It remains for the owners of buildings on such streets to turn to their advantage as far as possible the natural tendency of the new order of things, not to struggle uselessly against it. Now whether the value of the abutting property rises or falls on the whole, it is pretty sure that the relative value of first and second stories must change, and second stories rise in importance as compared with ground floors. As the lower stories become more like basements the problem will naturally be to enhance the value of the stories above. A second story with steam trains rushing to and fro before its windows may not seem very attractive, but it will have at least the advantage in sunlight, air, and outlook over those beneath it. To make the most of these advantages the desideratum would be to lift the current of foot-passengers, or at least one class of them, to the level which the railway passengers have already reached. That it is practicable to do such a thing we have the evidence of what has been done elsewhere, though not on such a scale as would be necessary in a city like New York. The so-called Rows of Chester are a famous example. These are a series of open second-story galleries lining the principal streets and taking the place of sidewalks, being tunnelled out, as it were, in the face of the buildings, which are built out over them and under them. The upper stories are supported on posts. In like manner a footway raised to the level, or nearly so, of the second floors in the streets that are most hampered by the elevated way, made continuous by bridging the cross-streets, and accessible by frequent steps from below, might go a good way to redeem them by bringing the lighter business up out of confusion and dusk into sunlight and air. In Chester there is no footway below; the cabs and carriages drive directly up to the doors in the lower stories, and the pedestrian must go down and up again every time a street is crossed. These conditions, which do well enough in the busy English market-town, would be intolerable in the thoroughfare of a great city. But in New York we have the sidewalks on the street level, and though a foot-passenger might not be tempted to climb to a higher level if he could only walk a block at a time when he got there, yet if he could walk a half mile, or a quarter, or even two or three blocks continuously, with access at every cross-street, he would be very likely to prefer the upper walk to the lower.

It would be undesirable, however, to improve the second stories of the buildings by still further deteriorating the lower, as would be done by carrying an upper gallery over the existing sidewalks, if it could be avoided. The natural way to avoid it would be to retract the upper footway behind the lower. This would take out its width from the depth of the second stories of the buildings; but the sacrifice would be more than made up in the advantage of access to them. The upper stories might be built forward over the second, in which case the galleries would be covered, like loggias, and open only on the front. They would then resemble the arcades that are so prominent a feature of some of the fashionable streets of Paris, and of many Italian cities, notably of Bologna, excepting that they would be lifted one story above the ground. This method would be most desirable when the streets were so wide as to keep the railway at a considerable distance from the windows, or when land was so valuable as to make room in the upper stories very important. Another way would be to retire the whole front of the buildings above the ground story. This would, in streets of ordinary width, probably be the better treatment. It would give both

lower and second stories the full benefit of all the light and air that was accessible, would add effectively to the width of the streets without corresponding sacrifice, and would give the aspect of a street of houses standing upon terraces.

Carried out in either way this device would increase the capacity of the streets in the most efficient way, by classifying the uses of them. We should then have on the upper plane, in the middle the rapid transit line for through passengers, sufficiently isolated, and on a level with it and in easy communication a range of shops for lighter and more elegant traffic, well aired and lighted, raised above the dust or wet of the street below, and served with a continuous and accessible foot-way. Below we should have what we have now, — the wagon traffic occupying the roadway, shops and warehouses for heavier or less aspiring business, and the sidewalks for those who frequent them. There would be the inconvenience of mounting or descending from one current to the other, but in these days of elevators this is less felt than it used to be. Given the occupation of the streets by the railway, we are inclined to think that this arrangement would make as good an account of it as could reasonably be looked for, and that the whole result would be far from deplorable. The effect would be practically to raise that part of the city by one story from the bottom instead of the top. The tendency to extend buildings upwards and downwards is already most characteristic of our large cities. In the crowded parts of New York it is common to have two underground stories, and there are sometimes three; to lift them one degree would be no less than a charity. The upper range of shops and offices which we have suggested would, we think, prove much more attractive than those below them; these in their turn would be a vast improvement on the basements whose uses they might take, as the basements would be on the sub-basements they might supersede. The advantage of being able to receive and deliver goods at one level, while show windows and customers are kept undisturbed at another, is one not to be overlooked, and for which comparatively few buildings have a compensation in a back entrance.

Architecturally considered the change would have some very inviting aspects. It is hard to say which is the finer feature in building, a range of upper arcades built over and open to the air, or a series of architectural terraces, the houses standing back and rising high above them. Both are among the most imposing means of effect at the architect's command, especially when filled with moving people, and both are thus far absolutely untried in this country. It is true that then, as now, the railway would be in the way, but the most interested part of the dwellers and passers would be lifted above it, and the view of a street so situated, from the upper foot-way on either side, might be made finer than anything New York has yet to offer.

The difficulty would be, of course, to get such a scheme adopted, for it would require concert. Men do not readily agree in such radical changes unless they are compelled to them by circumstances. The sacrifice of room for a foot-way from the second stories, if these are to be made accessible, is not to be spoken of lightly, but it appears to be necessary to get the full benefit of the remainder. The requisite remodelling of the buildings would have to go on gradually. Some legal difficulties as to rights of way and ownership might arise, but they could be provided for. If a sufficient combination should be made to try the experiment with a block or two, we believe that it would, by its success, warrant others in continuing it. The need of some such radical adaptation to the new order of things is likely to show itself soon. Brooklyn already talks of following New York in her scheme for quick transit, and if the present experiment succeeds other cities will in due time imitate it. It must necessarily change the conditions of streets over which the railway passes, and the welfare of those streets will depend on the readiness of their proprietors to meet the new conditions. We could find examples in most of our older cities of quarters which have every natural advantage, and yet have become worthless because their owners or the public have yielded to accidents of growth or of fashion, and for want of enterprise or invention to parry a temporary disadvantage have let them lapse into degradation. How far this new use of streets will work in this way remains to be seen. The resort we have suggested is one by which we think it can be turned to advantage. It would be well if the importunate pressure of business, which does so much nowadays to disfigure our cities, could be made the inspirer of a finer treatment of them than we have seen before.

FIRE-PROOF CONSTRUCTION.[1] I.

GENERAL REMARKS.

No material used in building construction, except brick or burnt clay, is practically fire-proof. A building constructed of incombustible material throughout, and stored with only small quantities of combustible and inflammable matter, can be considered fire-proof. Warehouses for the storage of miscellaneous merchandise cannot, with our present knowledge, be constructed absolutely fire-proof; we can only apply devices that diminish the danger by confining and localizing the conflagration. Generally, public places of amusement, churches, schools, offices, or dwellings, do not contain so much inflammable matter, such as furniture, etc., as to materially injure or endanger the safety of the building when properly constructed. Warehouses, when stored with inflammable matter, even if constructed entirely of brick, but without precautionary, sub-dividing walls, forming compartments, will succumb to the heat, by reason of the great expansion causing a movement of the walls and ultimate collapse of the floor arches.

All constructive iron-work in buildings, except those having small quantities of combustible furniture in them, should be protected from the direct action of a fire by some fire-proof and non-conducting coating, securely fastened to the member it is intended to protect.

The maximum temperature of a vigorous fire, raging in a building fed by combustible and inflammable matter stored therein, may be correctly assumed at 2,000°, — equal to that in brick furnaces. It is found that the strength of iron is diminished about 66⅔% when at a dull red heat, or a temperature of 977°; at this temperature, iron-work proportioned to three times safety, would be at the point of failure. We will compute, approximately, the time required in raising to 977° the temperature of a cast-iron plate one foot square and one inch thick, representing the side of a square column. The amount of heat required to raise the temperature of the plate to 977° is, — the specific heat of cast iron being 0.13 units, and the weight of the plate 40 pounds, — $977° \times 0.13 \times 40 = 50{,}804$ units. The conducting power of the plate, under the existing circumstances, is $233\ (2{,}000 - 977) = 238{,}559$ units per hour, and as we have only 50,804 units to conduct, the time will be $\frac{50804}{238559} = 0.213$ hours = 13 minutes. If the plate be protected by a layer or coating of ordinary plaster, one inch thick, the amount of heat conducted will be only $3.86\ (2{,}000 - 977) = 3{,}949$ units per hour, or $\frac{50804}{3949} = 13$ hours longer; when protected by 4½ inches of brickwork, only $\frac{233(2000-977)}{15} = 1{,}100$ units per hour will be conducted, or $\frac{50804}{1100} = 46$ hours longer.

Buildings stored with large quantities of inflammable matter may have cast-iron columns of square cross section, of the necessary dimensions to carry the superimposed weight, with skew-backs cast on, for supporting brick arches between the columns that carry the floors; the column is enveloped by 4½ inches of brickwork, as a protecting layer only. This method, shown by Fig. 7, admits a considerable reduction of the size of piers from those built of brick only; for example: The height of a pier is 18 feet, and the weight to be carried 100 tons; a cast-iron column 10 inches square, with thickness of metal 1 inch, will carry the weight with eight times safety; 4½ inches of brickwork will increase the size of pier to 19 inches. A solid brick pier, allowing 70 pounds per square inch as its safe resistance to crushing, will carry only $\frac{19^2 \times 70}{2000} = 12.7$ tons. To support a weight of 100 tons, the pier would have to be $\sqrt{\frac{100 \times 2000}{70 \times 144}} = \sqrt{19.91} = 4'\ 6''$ square.

It is asserted that iron is unsuitable for fire-proof construction, by reason of its failure when exposed to a certain degree of heat. That this is so is of course admitted; but, nevertheless, it is the only material at our disposal suited to modern requirements; and the architect will meet with more satisfactory results in devising means and methods for its protection against the destructive effects of fire, than by discarding it.

Columns or girders of wood resist the destructive effects of fire much longer than if made of iron exposed. The necessary dimensions, however, except for comparatively light structures, are such as to make the use of wood for those purposes impracticable; for example: A column of oak 18 feet high and one foot square will support with safety 25 tons, while a hollow, cast-iron column, one foot square and one inch thickness, of metal, will support 119 tons. So, also, will a beam of yellow pine 15 inches square, 15 feet span, and uniformly loaded, carry 16 tons, while three 15-inch light rolled iron beams, lying side by side and occupying about the same space, will carry 69 tons.

CLASSIFICATION OF FIRE-PROOF STRUCTURES.

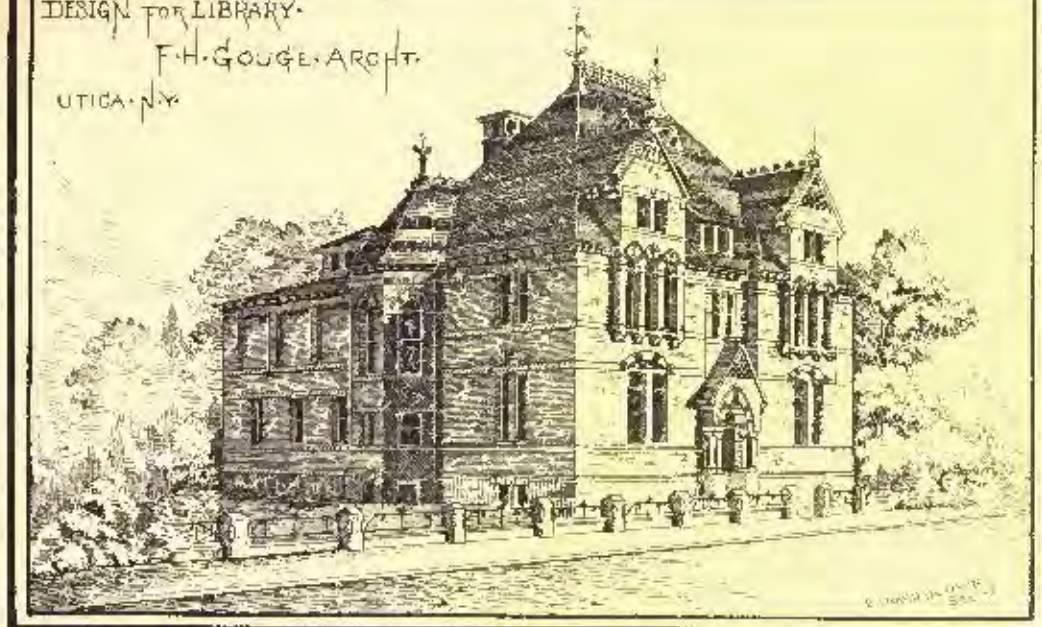
I divide fire-proof buildings into three classes:—

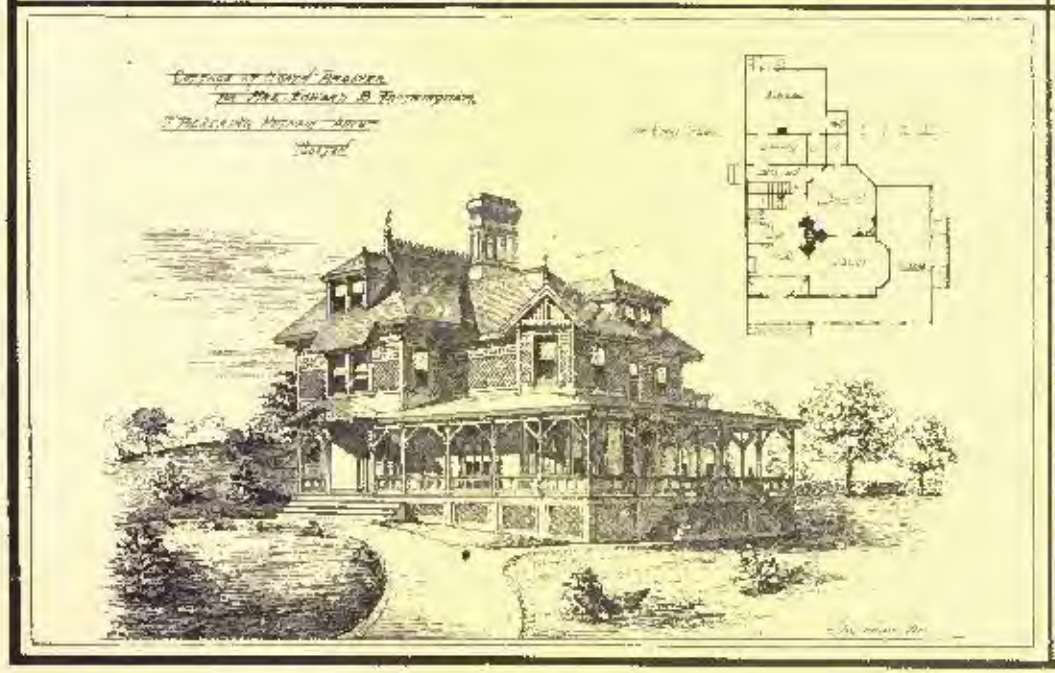
Class I. embraces those structures in the construction of which only incombustible material is used, and all constructive iron-work is properly protected against the action of fire.

Class II. embraces those structures into the construction of which incombustible material enters, but the iron-work *not* protected by fire-proof and non-conducting coatings. Suitable for buildings not containing so much inflammable matter as to injure or weaken the iron in case of fire.

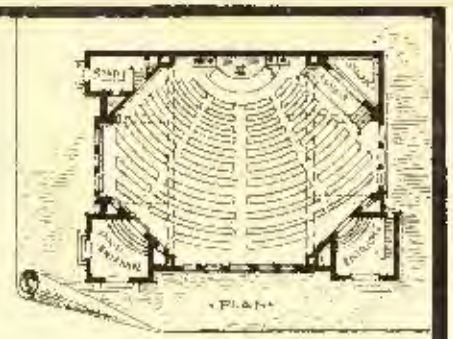
[1] A paper by V. Schumann, C. E., read at the last annual convention of the American Institute of Architects.

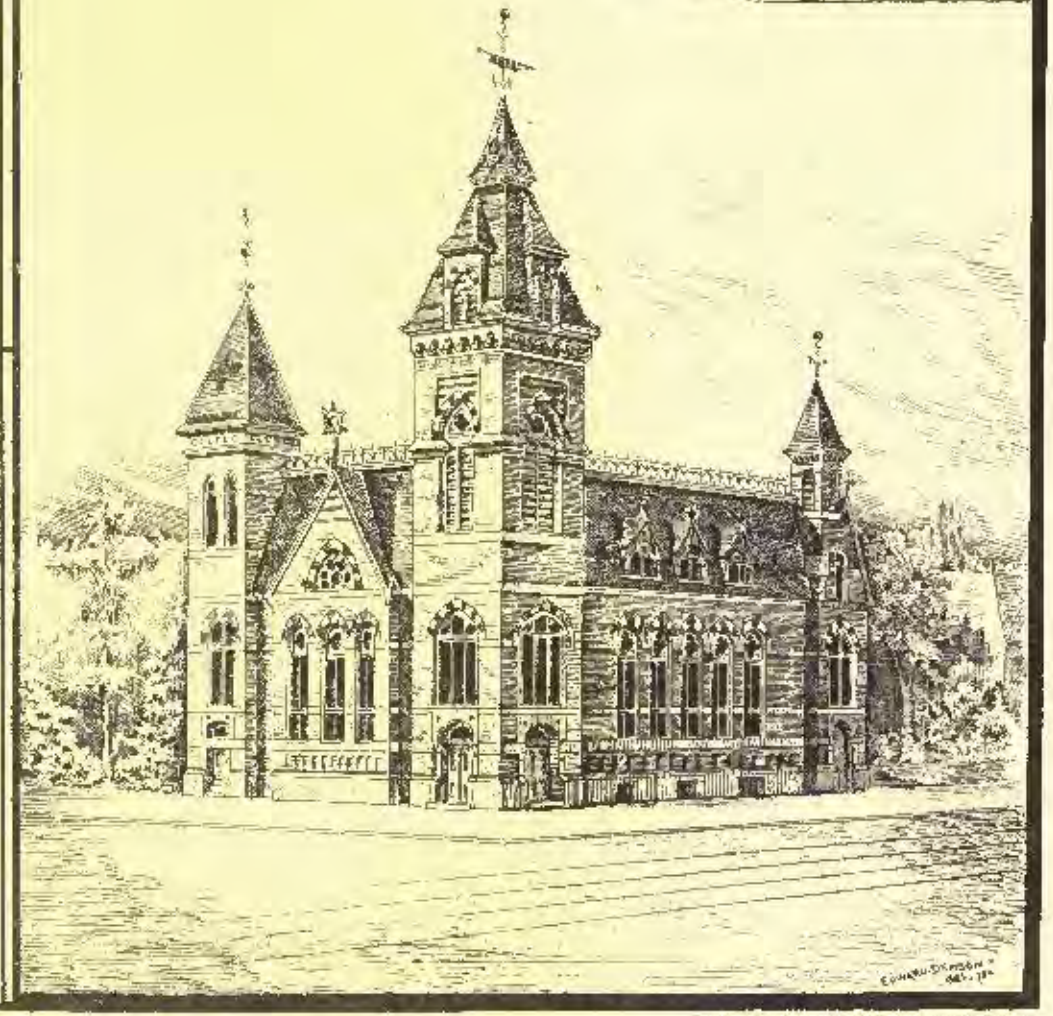
DESIGN FOR LIBRARY.
F.H. GOUGE. ARCHT.
UTICA. N.Y.



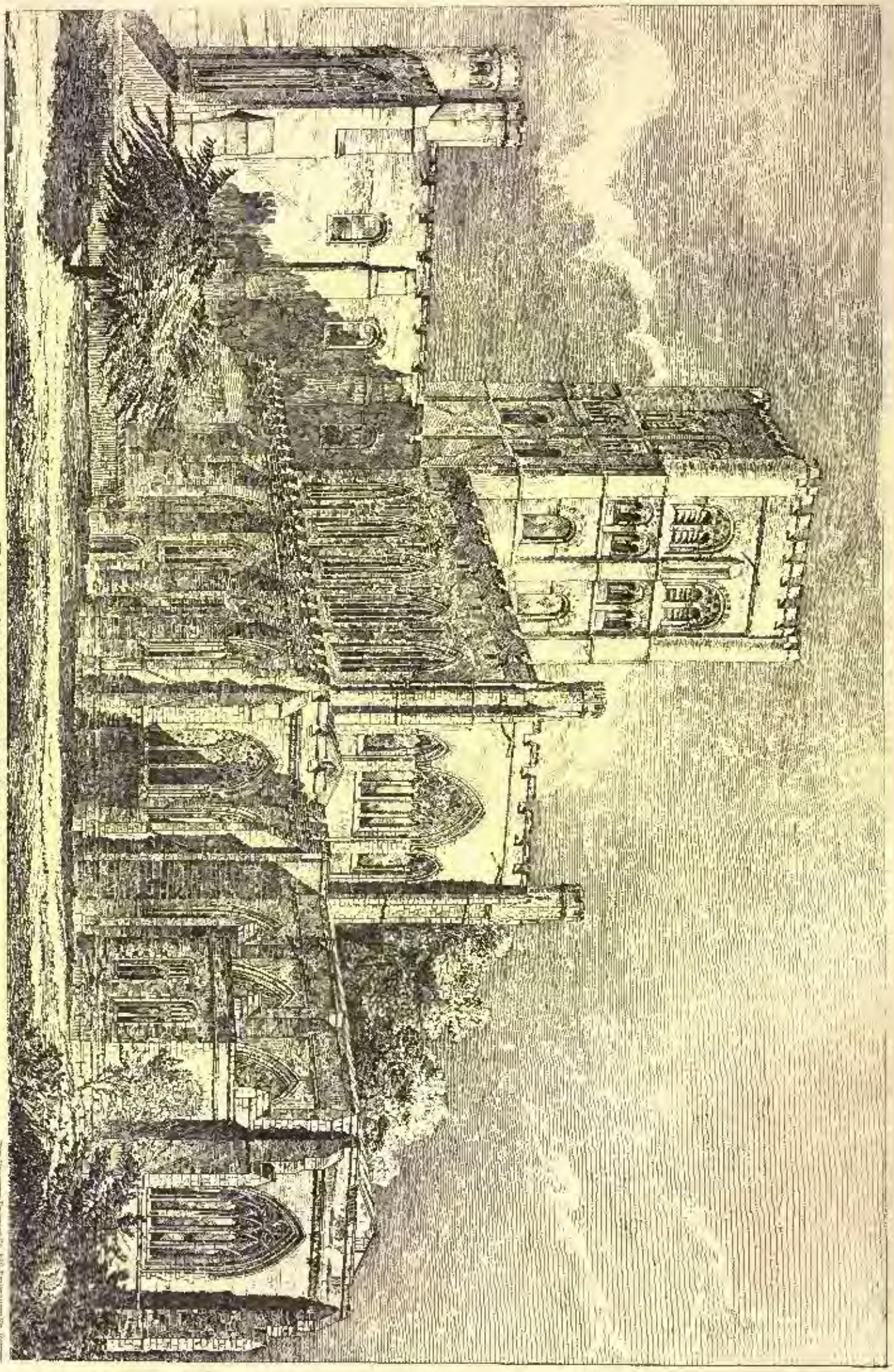


JEFFERSON PARK CHURCH.
CHICAGO.
J.C. COCHRANE ARCHT.





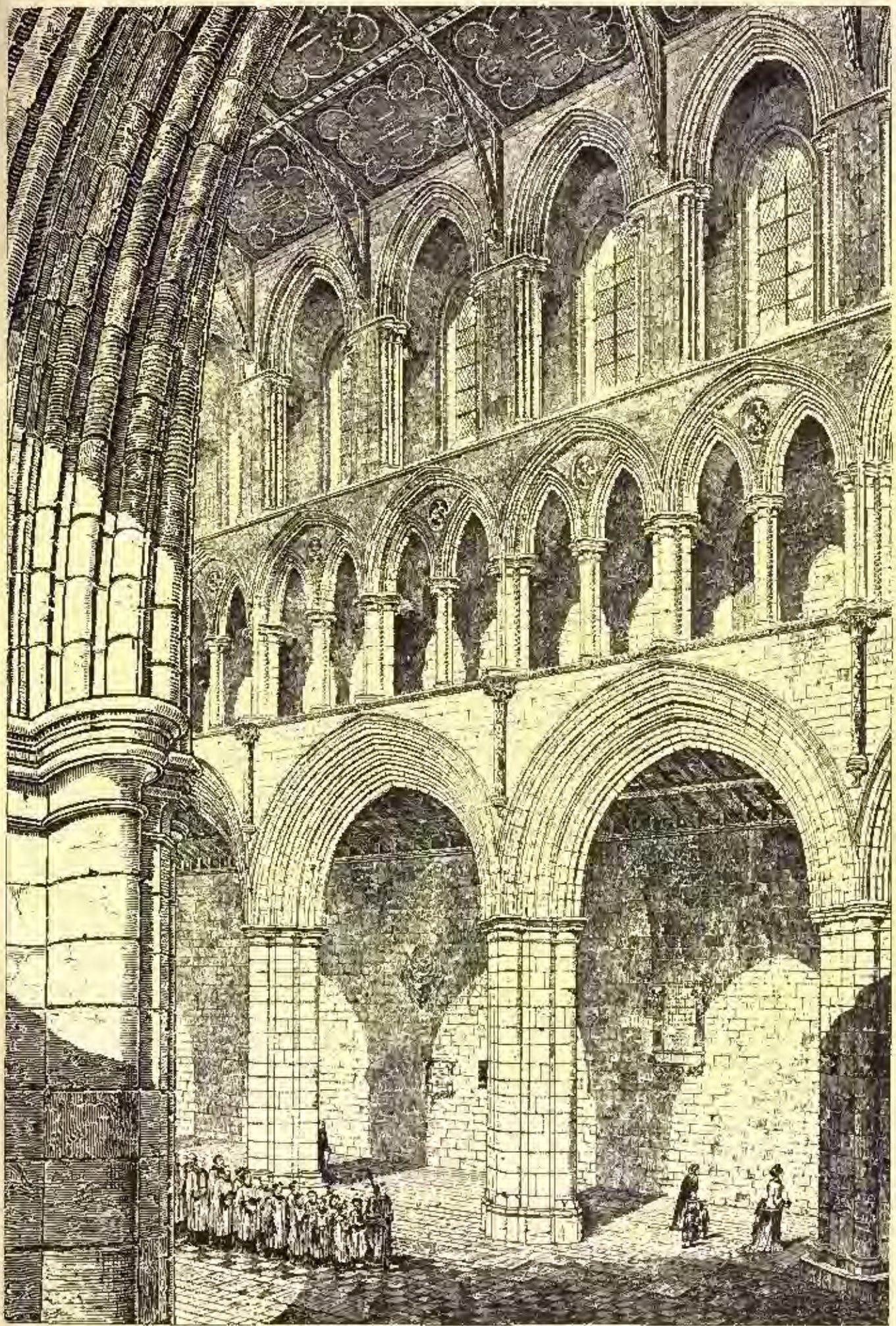
THE HELIOTYPE PRINTING CO. 337 DEVONSHIRE ST. BOSTON



ST. ALBANS ABBEY:—VIEW FROM SOUTH EAST.

FROM THE ABBEY CHURCH OF ST. ALBANS, HERTFORDSHIRE, BY JAMES HALE, 1854.

THE HOUGHTON PRINTING CO. 220 DEVONSHIRE ST. BOSTON



ST ALBANS ABBEY:—VIEW IN THE NAVE, (LOOKING NORTH WEST)

FROM "THE ABBEY CHURCH OF ST ALBANS, HERTFORDSHIRE," BY JAMES MACE, ETC.

Tower
of
Brattle Sqre
Church
J A Mitchell - del

Class III. comprises all buildings in the construction of which combustible material is used, but all vital members protected by fire-proofing.

DETAILS OF CONSTRUCTION.

Class I. or II. In the construction of Class I. all combustible material is rigorously excluded, except for doors, window-sashes, stair-rails, flooring, and skirting. The external faces of outside walls may be either of brick, sandstone, or granite; the backing to be of brick with a hollow space two inches wide, located one brick distant from the inner face of the wall. All openings in the brickwork to be arched. Roof construction, furring, and lathing, of iron. The floors to be constructed of iron beams, supporting arches of brick (Fig. 1), hollow tile (Fig. 2), or corrugated sheet iron (Fig. 3); the haunches and crown to be filled with concrete, level with the tops of the beams.

Fig. 1.
ARCHES OF BRICK.
Weight of construction from 60 to 100 lbs. per sq. ft.; *a*, single rim arches of brick, up to 8 ft. span; rise of arch 1-12 of span; *b*, rolled iron beams; *c*, concrete filling; *d*, strips of wood 2½ × 2½, about 18″ from centres; *e*, flooring nailed to strips *d*; *cc*, filling between strips.

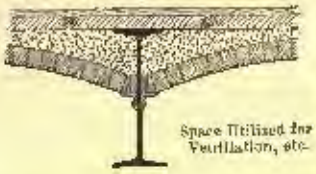


Fig. 1a.
The arches may be supported on angle irons riveted to webs of deep beams.

When floor-tiles are used they should be bedded in about one inch of cement, spread over the concrete; when of wood, wooden strips two by two inches, to which the flooring is nailed, are bedded on the concrete from 16 inches to 2 feet apart; the spaces between the strips being filled with cement mixed with fragments of porous brick. Practically there is no difference between the above methods as to strength, but considerable in weight, the order being as follows, commencing with the lightest: Hollow tile, corrugated sheet-iron, brick. When ceilings are to be plastered the plaster is applied directly to the brick arches and hollow tile, the corrugated iron arches are merely painted.

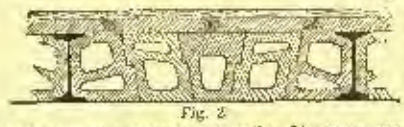


Fig. 2
FLAT ARCH OF HOLLOW TILE, FROM 6 TO 12 INCHES DEEP.

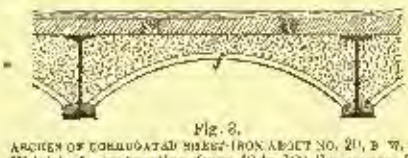


Fig. 3.
ARCHES OF CORRUGATED SHEET-IRON ABOUT NO. 20, B. W. G.
Weight of construction from 40 to 100 lbs. per sq. ft. *f*, corrugated sheet-iron arches up to 8 ft. span; rise of arch as desired.

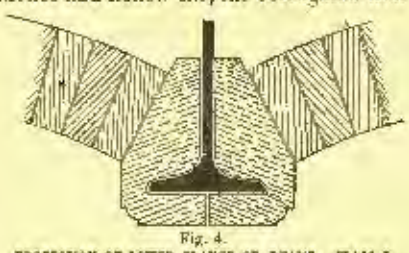


Fig. 4.
PROTECTION OF LOWER FLANGE OF BEAMS. CLASS I.
Burnt clay skew-back, formed to lap flange.

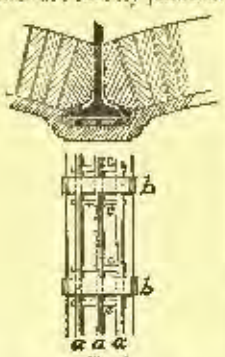


Fig. 5.
PROTECTION OF LOWER FLANGE OF FLOOR BEAMS.
View from below. *a*, iron rods ⅝ in. diam.; *b*, flat loop iron bent around flange, about 4 ft. apart; *c*, wedges; *e*, plaster.

When flat ceilings are required iron lath is riveted to small ⊃ or T irons that run from and rest on the bottom flanges of the beams; the hollow tile is generally made for flat ceilings.

It is important that the soffits of beams and lath to iron girders receive a coat of some good fire-proof and non-conducting material, not less than one inch thick and securely fastened on. A mixture of asbestos and pipe-clay is very effective. The soffits of floor-beams may also be protected by the brick skew-backs of arches being made in such a form as to lap the lower flanges of beams (see Figs. 4 and 5).

THE ILLUSTRATIONS.

ST. ALBAN'S ABBEY, ENGLAND.

So much has been said of late about St. Alban's Abbey Church, both as to the actual restorations that are going on (*American Architect*, Nos. 92 and 126) and as to the proposed restoration of the west front as a memorial in honor of the late Sir Gilbert Scott, that many of our readers must be curious to know what manner of building it is that is under discussion. This curiosity we are in a manner able to satisfy by reproducing from the *Architect* two of the illustrations from the monograph on St. Alban's that has just been published by Mr. James Neale, Architect, F. S. A., A. R. I. B. A. One is a view of the Abbey from the southeast where can be seen the fine Norman tower, built with materials from the Roman Verulam, which is thought to be in the same state as when built eight hundred years ago. The other is a view of the nave looking northwest. The nave of Winchester Cathedral is usually said to be the longest nave in the world, and this is true of its interior dimension, but when measured on the outside, the nave of St. Alban's is found to be longer than it by nearly nine feet. The extreme dimensions of the building are 550 feet 1½ inches in length, and in breadth 204 feet 10 inches.

THE TOWER OF BRATTLE STREET CHURCH, BOSTON, MASS. MESSRS. GAMBRILL AND RICHARDSON, ARCHITECTS, NEW YORK.

This drawing, which was intended to form a feature of the title-page of the sketch-book of the Portfolio Club, to whose drawings we have fallen heirs, was made by Mr. J. A. Mitchell, a young architect of Boston, who some time ago abandoned the profession, and has been studying the art of etching in Paris, where he has lately achieved no mean repute with his needle. *L'Art* lately published one of his etchings, which has attracted much favorable criticism and caused no little surprise that an American could produce a work so technically good and so in harmony with French feeling. The subject of the etching is the Place de l'Opéra at Paris.

JEFFERSON PARK PRESBYTERIAN CHURCH, CHICAGO, ILL. MR. J. C. COCHRANE, ARCHITECT.

This church, which is located on the corner of Adams and Throop Streets, was dedicated the second Sunday in January last. The size is 77 feet wide and 110 feet long, extreme. The auditorium is 72 feet 6 inches by 93 feet, and 34 feet high from floor to ceiling. It is a brick superstructure upon stone basement, faced with press brick and relieved with Au Sable sandstone. The roof is covered with ornamental slate and surmounted with iron crestings illuminated. The brick walls are enlivened by courses of black brick and panels filled with majolica tiles. The columns sustaining the entrance door caps are of blue Scotch granite with white marble caps and bases. The interior is frescoed and the wood-work painted. The entire cost of the structure was $29,202.67.

DESIGN FOR A LIBRARY BUILDING. MR. F. H. GONGE, UTICA, N. Y.

This design was submitted in competition for a library building in Utica, N. Y.

COTTAGE FOR MRS. E. B. FROTHINGHAM, NORTH ANDOVER, MASS. MR. J. P. PUTNAM, ARCHITECT, BOSTON.

THE FRENCH EXHIBITION.

III.

THE entire show may be said to represent every conceivable ideal connected with modern French life, civil, municipal, social, domestic, and personal. The appliances of eating, drinking, and dressing, the house, stable, and garden, agriculture, manufactures, and commerce, — all are shown in their results and productions. As to the arrangement of this complicated mass of visible things, it seems to be based on the principle that man, the king of the universe, is the centre of the show. The productions of art, his most refined enjoyments, are in the middle; books, maps, plans, models, scientific instruments, all that educates him, come next; then follow jewels and ornaments, clothes, furniture, carriages, and so forth, as the circle enlarges; till we come to the heavy machinery, agricultural and forest tools, — in short, the means by which he is to wage his warfare with brute nature. Some such philosophy, we suppose, rules the arrangements of the Exhibition, and all nations have had to conform to them. The foreign side carries them out indifferently, for foreign exhibitors occupy their space according as it is convenient or even possible for them to send wares that are movable and worth showing. France, however, is at home, has the command of material, is able to regulate the proportion in which one class of things shall be seen with relation to others, and to turn out, as she has done, a scientific and effective display. We shall not have to notice anything very astounding or new, but the clever use of drilled forces and united action has never, we venture to think, been shown to greater advantage.

Entering modestly the outer lines and defences of this vast web of human interest, and as travellers coming from one of the hotels of Paris, we cross the bridge of the Alma. A broad shed, double in some parts, is the outwork first encountered on the Quai d'Orsay. It contains agricultural instruments for steam, horse, and hand power, but the best specimens of such things we have seen already in the English and American outquarters. Besides ploughing, reaping, thrashing, mowing, and other engines, here are actual roots of potatoes, beets, turnips, and so on, in many varieties; specimens of cereals, hives, stables and stall fittings, dairy and poultry arrangements, and the like. Down to the right, close to the edge of the river, a long sea-water aquarium, with tanks for illustrating pisciculture and other watery science, is laid out in extenso. A fresh-water aquarium is arranged in the Trocadéro Gardens. A vast shed, also close down to the water, contains boats and boat-gear. A life-boat, with wheeled carriage and launching bed complete, on our own admirable model, stands conspicuous here. A placard names a worthy couple who have presented it to a special station, and a few touching words explain that it is a memorial of some one dear to them. We believe that, if the Seine had been big enough and its bridges high enough, we should have found the republican fleet in this direction. Models complete with masts and rigging, the most fascinating of toys, supply their place, and give perhaps as much informa

tion regarding that force as it is thought desirable to impart. Our readers can see as good, perhaps a better, display of this description at South Kensington. Other nations also show boats down in this region; our own steamship companies, to wit, and several private builders. Besides actual boats and models, here are to be seen propellers, portions of engines, lifting and launching gear, diving and life-saving dresses, and apparatus of many kinds. The nations will be tolerably well grouped together in this class, which will perhaps be as instructive and as interesting to practical men of maritime countries as any part of the collection.

Ascending some twenty feet of wooden staircase, we reach level ground. In odd corners, along alleys and borders of the garden, are to be seen flowers, rhododendrons, fruit-trees trained on espaliers in many quaint ways, hot-houses, green-houses, orchard-houses, and forcing-beds of various kinds. In showy little temples of many shapes are stored rough materials, — *e. g.*, the produce of the national quarries and marble beds; coal and mineral ores; all the materials and machinery for making gas, and materials used for fuel and lighting of other kinds. A large building contains specimens of the great iron manufactures at Creusot; the most observable being a huge Nasmyth hammer, the legs stretching thirty-six feet, such as have long been used in the arsenal at Woolwich. If we keep still outside the great palace, we find half a mile or so of outer *cimeze* containing machinery not in action. Then follows a gallery of tools, utensils, smaller machinery, carriages, and harness, with one or two drags and folding carriages, but nothing of special note in the way of carriages, or better than can be seen in the corresponding British gallery; in fact, the luxury in these things is less than it used to be in the days of the empire. Between these galleries and the long space allotted to fabrics, furniture, and things of personal and household requirement lies a wide gallery containing the French steam machinery in action. The various engines resemble those which have been noticed on the foreign side, only they are in greater numbers. This profusion is satisfactory, as it helps to show the mechanism required for every operation of steam manufacture in France, for the production of fabrics of all sorts, for wood-work, tools, and utensils. All large factories, whatever they produce, employ steam in one or other of their operations; and the subject may be studied completely by the aid of the French, British, American, Belgian, and other sections. Lenses and lanterns for light-houses are set out in this gallery. A number of engines are in action all day, and the whirling of colossal wheels, the movement of pistons and cranks, will bewilder the general visitor.

Returning from these outworks of human industry to the grand river front, we may take the left half of the corridor, the right half of which is filled by the Indian exhibition. In this portion a lofty astronomical clock shows the time, the movements of the earth, and the changes of the seasons. An octagon glass case contains the crown jewels, to be shown, we may suppose, as curiosities of the past. Beyond this a long screen, divided into bays and provided with curtains, contains specimens of the Gobeling tapestry, and others, less masterly in treatment, from Beauvais. The manufacture of these beautiful productions, the finest that are made, carried out at the expense of the state, has been kept going continuously from the days of Colbert, who started the factories in order to raise the manufactures of France to the utmost perfection attainable. The tapestries are made from the designs of the best artists of each age, or copied from the old masters. Draughtsmen and workmen pass through and are turned out from these factories with a training as complete as it is possible to give, — a great advantage to employers of skilled labor, and indirectly a source of increase to the national wealth. A glance at these tapestries, which are but few in number, will show any visitor what long training and accurate knowledge must be required for their production. At each end of this screen are set out masterpieces of the porcelain factories of Sèvres, also state establishments; vases of *bleu-du-roi*, with enamelling of figures *pâte sur pâte*. By this term we are to understand a process of modelling in very delicate relief by putting layer over layer of white enamelling on the dark ground. Here also are Celadon gray vases, imitations of Oriental ware, and many other beautiful kinds of porcelain. These are the master productions of this kind of art, and of course are not surpassed in their several ways either by private firms or by any of the foreign contributions.

The end of the French fine-art galleries looking on the broad transverse avenue of the building is faced with an audacious architectural front of painted faience by Deck, more bold indeed than agreeable. A few big pieces, triumphs of baking and firing, are set up in conspicuous places. The curious visitor will do well to note how certain difficulties encountered in firing large pieces and in baking the colors are got over. He may compare the Japanese and Chinese with English and Continental execution, as shown in the clean or blurred portions of the coloring.

Bronzes, those of Barbédienne and other employers, are of the highest merit in the French division. There are fair examples in the Italian also, but France bears the palm. Statuettes, chandeliers, and ornamental works of all kinds are exhibited in profusion. One of the great furniture makers of Paris is Henri Fourdinois, who exhibits various sumptuous pieces. Grohé opposite shows the highest type of workmanship in all branches of his business. These are representatives of an avenue of exhibitors. Buttle-work, mahogany tables and cabinets with gilt mounts, carved panelling, door frames, marquetry, inlaid work, greater varieties of furniture than we make at home, are turned out by these exhibitors. Their cast and chiselled gilt metal mountings deserve careful examination. We can as yet produce nothing equal to them. Upholstery, tables, chairs, house-fittings innumerable, line the avenue for a long distance. It is in the provision of these appliances of luxurious life that Paris is rich. In a hundred other forms, which there is no space to go through in detail, Parisian industry is supreme in "fancy" manufactures. Visitors will see these attractive productions in their very highest perfection ranged in tempting fashion under their eyes as they wander up and down these gay courts and galleries. They can be examined in a way that is impossible in shops. Attendants and stall-keepers are obliging and communicative, and manufacturers have not the smallest wish to hide either their talents or their inventions under a bushel. — *The Saturday Review.*

CORRESPONDENCE.

BRICK BUILDING IN MINNESOTA. — THE BUILDING RESOURCES OF THE STATE. — BRIDGES. — IMPROVING THE HEAD WATERS OF THE MISSISSIPPI.

MINNEAPOLIS, MINN.

The metropolis of our new commonwealth has recently made itself known to the world by carelessly throwing half a million of money and half her flowing interest into the air. The fragments have been cleared away, and other and larger mills are to replace the lost.

The head waters of the Mississippi have long been attractive to the tourist and sportsman. The agriculturalist has followed them, and has in turn been followed by the builder, the manufacturer, and others. The builders in a new country are quick to adapt themselves to the requirements of the situation. They are little hampered by considerations of style or tradition. They are obliged first of all to consider the dwelling.

The air of Minnesota is surprisingly clear. It is such that dry-rot is practically unknown. The straw left by the thresher strewn on the field must be burned, for it will not rot for years. The winter frosts penetrate often to a depth of six or eight feet.

The head waters of the Mississippi furnish pine for a large part of the great Northwest; and there is scarcely a corner of our State, which, if not furnished with a quarry of good building stone, is not favored with a bed of good brick clay, or at worst with a thorough sprinkling of stones from the "drift." Considerations of cheapness compel the use of wood largely, and the same, coupled with a want of time and desire to save labor, have tended to develop the "balloon frame" to its farthest degree of perfection, — or imperfection, if you will. When brick is desired "for finish" the same conditions of economy and the greater one of warmth have favored the use of the "brick veneer."

One may chance upon a pretentious building, to all outward appearance of solid brick masonry. He may rest assured that the structure owes its stability to a stout wooden framework covered with boards and papered; then, after an intervening air space of say one inch comes the "veneering" of brick and cut stone (or substitute) anchored to the frame by large nails driven partly in, the heads being built into the joints of the masonry. The inside may be boarded, furred out again, and plastered. Filling between the studding with sawdust or "back plastering" is not uncommon. All sorts of devices are in use to secure warm floors. The utility of multiplying air chambers is thoroughly appreciated.

As it would largely increase the cost of small houses to go below frost with the foundation walls, and it is found that it adds nothing to the stability of the structure, they are built on top of the virgin earth, and the cellar is usually a large cylinder, six or seven feet deep, placed conveniently within the foundation, and generally bricked up to the flooring of the first-story with one four inch course. It has one window in the outside wall.

The architecture of the West is and must be for a long time to come largely an architecture of wood, and that, too, of boards and thin "dimension" lumber. The word *timber* scarcely applies to any of the lumber used in dwellings.

The builders have given us very rationally constructed buildings, but they are most irrationally ornamented, with few exceptions. The early art efforts of the untutored (white) American seem everywhere to have been more or less expended in these later years in making things appear what they are not. We have much wooden stone-work, duly painted and sanded; wooden iron-work made to imitate cast-iron and painted black; wood-and-iron together stone-work, painted and sanded. In an important public building, built in 1877, by a prominent member of "the profession," one may see an arched main entrance of a single artificial stone, with joints nicely marked on the surface. Those of us who are not so radical as to believe that the jig-saw has not its use are made every moment conscious that it has its abuse. Yet good taste has not been entirely wanting. One or two of our earlier architects have used materials, if not in an academic, in quite a masterly manner.

Our clear air renders very delicate detail effective, and the thinness of the lumber at command should suggest perhaps something of the German treatment, yet without too broad projections; for our winter days are short, and we can afford to lose no moment of sunshine. English work is too much the treatment of timber, and to make timber-work of timbers composed of thin layers nailed to-

gether is at least hazardous. Nor are the rude forms of timber designs at home in our atmosphere.

Excellent bricks are to be found in all parts of the State where the demand has warranted their manufacture. A fairly good, although somewhat too sombre-colored, red pressed brick is manufactured at Red Wing, but most of the clays of the State burn light colored. The local bricks are remarkably hard and dense, the clay approaching in this respect that used for the manufacture of stone-ware pottery. The color is much deeper and richer than that of Milwaukee fronts, and is more favorably affected by time. The clay, however, contains minute lumps of sand impregnated with iron, which fuse in the burning and leave unsightly dark spots on the surface. This peculiarity and the difficulty of obtaining suitable sand has prevented the successful manufacture of pressed bricks. Minneapolis and St. Paul, ten miles below, depend for stone upon an abundant and very beautiful bluish-gray local limestone, which is easily obtained in courses of almost any desired thickness. The great ease of obtaining the stone in courses has led to a fashion of building all sorts of walls in heavy courses, quarry-faced. This has hurt the appearance of some of our best churches and public buildings. This limestone is not well suited for cutting, and must not be too much exposed to the weather. The climate of New England would doubtless disintegrate it very rapidly, but here, where properly used, the work of fifteen or twenty years ago (there is very little of it) seems to be uninjured. For cut stone, granites can be obtained a few miles up the Mississippi. There are several colors, among them a red granite which almost rivals the Scotch in color, but is slightly inferior in grain. The neighborhood of Duluth furnishes a number of red and brown sandstones; one quarry of the latter very nearly resembling the Portland, Connecticut, brown stone, but not furnishing as large stones. Several extensive beds of strong, durable, good-colored stone, composed of about equal parts of lime and sand, are found in the eastern part of the State. They are effective when finished with tools, but must not be rubbed. They vary in color from buff to salmon.

The public works of Minneapolis do her at least comparative credit. The river just above the Falls of St. Anthony is divided by Nicollet Island. The greater channel is crossed by a suspension bridge of 675 feet span. A stone arch bridge in five arches aggregating 330 feet is nearly completed across the lesser channel. While Captain Eads has been practising his gigantic dentistry in the mouth of the Mississippi, works of no small magnitude have been in progress at the head of navigation. The Falls of St. Anthony are formed by a ledge of limestone supported by a very friable sandstone, which readily decomposes when exposed to the elements. Sketches by the early Jesuit Fathers show the falls at the time of their visit to have been nearly one-third of a mile below their present position. The limestone ledge runs out a short distance above the Falls, and as it becomes thinner breaks more readily. Should nature be allowed to take her course the end of the Falls of St. Anthony were easily predicted. The device has been adopted of making a timber apron at a slant of about 30°, down which the water now glides from the brink to the bed of the river below. This modification of the cataract is not picturesque. Some capitalists conceived the idea of utilizing the island for manufacturing purposes by making a "tail race" in the soft sand-rock. The water in this opening bade fair soon to undermine the entire island, and distribute it at different points from its present position to the Gulf. After a hard fight the river was stopped out, and to prevent its ever getting under the ledge again a concrete wall has been built in a tunnel made to receive it, across the entire width of the channel, from the bed of the stream below the Falls to the under side of the limestone ledge. The Government kindly considered the wall and the apron as improvements to navigation and paid for them.

Of the city buildings the most important is the new high school-house, now approaching completion. It is of the local gray limestone, with finish of cream-colored Kasota stone. It is well planned, and the provisions for heating and ventilation are admirable. The design is Gothic in style, quiet but not commonplace, quite honest and straightforward, and has many graceful features. Some fairly good stone-carving and wrought metal-work are introduced.

The best designed and least popular building we have is Plymouth Church, by Mr. Russell Sturgis of New York. It is perhaps a little too severe, and the interior wall colors are especially unfortunate, but it meets the requirements of its large congregation and its service admirably. It has doubtless suffered much in execution. There are few workmen here who are not executioners.

The condition of the profession here is not exceptionally desirable. All manner of quackery has a rank growth in new soil. One advertises as "the premium architect." There is no end of "practical" practitioners. New men (in more senses than one) are constantly swarming "from the East" or "from Europe." The architect lives his day and passes on, nor are those who live longer always cases of the "survival of the fittest." There is no association, no *esprit de corps*. Yet despite all this the profession is gradually gaining a foothold and becoming more of a necessity to the public.

H. H. H.

THE GREGORIAN CALENDAR IN RUSSIA. — According to a Warsaw letter, the Gregorian Calendar is likely to be adopted in Russia. The Council of State and the Ministers have for some time been using both the old and the new styles.

PETRIFYING LIQUID.

FLUSHING, L. I.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — In our village and along this coast we are troubled with damp walls, and various compositions and paints have been applied in order to cure them, but without reaching satisfactory results. The best white lead did not prevent rain beating through, and plaster and paper were always green and peeling off. When the writer was in England some months ago his attention was drawn to a petrifying liquid as a real remedy for damp buildings, and which is largely used on brick and stone walls, curing them entirely, preventing vegetable growths and chipping or disintegration from effects of the weather.

The petrifying liquid is made from a peculiar deposit of silica held in solution, which penetrates the pores of brick and other similar material, filling them up and presenting an impenetrable surface. Believing that this article might protect our buildings, we procured some and applied it to our walls with the most satisfactory results. The walls are always dry now, and the stone and brick have been revived by coating them with the liquid, which we have tested in various ways. It fully sustains the recommendations it brought to us in England, and we believe it would come into general use if it could be procured here. Does any one have it for sale in this country?

Trusting you may find the note of interest to publish,

Yours, etc., W. R. L.

ART, SCIENCE, ARCHITECTURE, AND LITERATURE.

At the dinner during the late conference of architects at London, Mr. Beresford Hope, M. P., proposed as a toast: "Art, Science, Literature." He would suppose that Architecture was holding a family party to-night, and that she had invited him to introduce two very graceful and accomplished sisters of hers, and an equally accomplished first cousin. Her sisters were Art and Science; her first cousin, Literature. He supposed he ought to take the nearest relations first, but really he felt some difficulty in bringing them into such close family relations, because he could not for his life make out, when he met those ladies in Conduit Street, or in Great George Street, or elsewhere, which was which, — which was Architecture, which was Art, or which was Science. He sometimes thought it was one personage, who duped her friends by means of different dresses, or that the three probably exchanged garments. What was art? Art was the means of throwing into visible form the bright ideas that passed through the intellect, of beauty in outline, in shade, in proportion, in skyline. That was art; but he defied them, also, to give a better idea of architecture than that. Painting, Architecture, and Sculpture, all aimed at the same development of the beautiful in different ways. Therefore he would tell her sister-in-law, Art, who of course led Painting and Sculpture in her train, that she was rather a pert and pushing minx to take that name of hers, as if her sister Architecture was not as artistic, every inch of her, as Art so-called. Then, again, there was that lady — also very beautiful, though she was apt to do a thing which, in a pretty woman, was most repulsive, for she was apt to come amongst us with spectacles on. Well, Science came with her spectacles, and he asked her, "What are you doing to help the constructive powers of the world?" She would reply, "I try the strength of all materials. I see that girders do not break; that structures do not collapse; I know what marbles and terra-cotta are affected by the atmosphere, and what kinds are not so affected. The stability of the building and the color of the building are in my hands." "Thank you," he should reply, "but I think an architect who makes himself a good architect realizes all these things." In short, both the loves and the jealousies of this family party of three sisters were above his comprehension, and he consequently turned to the cousin, Literature, who could not exist without Architecture, and who, without her, could not have risen to those higher studies which now obtained. On the other hand, where would Architecture have been without those descriptions of buildings, impossible perhaps in reality, but existing in a fine imagination, which gradually drew architecture to a higher level? The descriptions given by literature of the glorious palaces of antiquity, and in more modern days Spenser's description of the palace of the Faerie Queen, and Bacon's thoughtful philosophical essays, all came to the aid of Architecture. But then again, if Architecture had not made the strides it had, where would Literature have been? Should we have had buildings like the Houses of Parliament, or should we be living in wigwams at the present time? Literature and Architecture were keeping, and would keep till the crack of doom, a running account with each other, in which one or the other would always be debtor or creditor. — *The Architect.*

OUR readers have doubtless noticed that we issued with our last number three pages of illustrations, instead of four as usual, and have, probably, rightly ascribed it to an accident, which prevented our publishing the views in the galleries of the Vatican, to which the writer of the Papers on Perspective referred as Figs. 45, 50, and 51. We hope, however, to make good the deficiency before long.

HEREAFTER our year's issue will be divided into two volumes, of six months each. The uncomfortable size of the volume containing

all the numbers of the year, the fact that many of the earlier numbers of the year are lost or badly mutilated before the time has come when all can be bound together, and the great practical value of an index of the first half of the year, or in other words, of a complete index of twice the size and comprehensiveness of the former ones, have induced us to take this step.

We desire to call attention to the several notices to subscribers relating to unpaid subscriptions and to the binding of the journal, which will be found under the Publishers' Department.

NOTES AND CLIPPINGS.

Fatal Accident in Salem, Mass. — By the fall of a newly-erected brick arch in A. D. Breton's bakery, on Boston Street, June 22, one man was killed, and another was seriously injured.

Wages Abroad. — Taken in connection with our own labor wages report the following figures, furnished by the U. S. Consul at Dundee, are of some interest: During the past five years wages have advanced from five to fifteen per cent. Fifty-nine hours make a week's work in the building trades. Bricklayers and plasterers now receive 20 cents an hour; plumbers, masons, and slaters, 16 to 17 cents; painters and carpenters, 15 cents, and common laborers on building work, 12 or 13 cents. Stone cutters are paid 24 cents. The weekly pay ranges from $6.12 to $12.24. Engine and machine working artisans receive from $4 to $8 weekly, while the various manufacturing tradesmen get from $3.50 to $8.50, according to trade and skill.

In Australia the average wages per day of ten hours are, for carpenters, $1.25 to $2; roofers, $1.75 to $2.50; plumbers, $1.75 to $2.25; painters, $1.25 to $2; machinists, $1.25 to $1.75; coopers, $1.50 to $2.50; sawyers, $1.50 to $2; engineers, $1.50 to $2.50; blacksmiths, $2 to $2.50; boilermakers, $1.25 to $2; cabinet-makers, $1.25 to $2; laborers, 90 cents to $1.25; brass-finishers, $1.50 to $2.

Tunneling the Delaware. — Mr. Thomas S. Speakman proposes, for what purpose does not appear, to lay a tunnel under the bed of the Delaware, or rather under the deep channel of the Delaware, for his scheme has this peculiarity: The tunnel, which is to be formed of two distinct lines of iron cylinders sixteen feet in diameter and eighteen hundred feet in length is to stand on the Philadelphia side, and comes to an end on the bar midway of the stream. Here it is to be connected with a bridge which is to cross the shallower channel at such a height as to allow the passage of such craft as usually ply on that side. At the junction of the bridge and tunnel is to be built a large hotel, which perhaps is the *raison d'être* of the scheme.

Flour Dust. — In speaking of the late explosion at Minneapolis the *Mill-Stone* says: On the south side of the mill there were two rows of bulks, ten in each. A strong current of air was drawn through the conveyor boxes connected therewith, and this current of air took up all the fine particles of flour dust, and the moisture and gases generated in grinding, and discharged them into two dust rooms in the story below, where the dust was allowed to settle. The daily deposit in these dust rooms was about 3,000 pounds, which was removed every morning, and consequently the dust rooms were half full or more of this fine dust, and the air in the dust rooms and conveyor boxes and blast tubes leading thereto was also fully charged with it. Owing to a choke-up in some of the feed spouts leading to the middlings stones above, one or more of them, in Mr. Christian's opinion, must have been running dry, and thus set fire to the dust in the conveyor boxes, being thence instantaneously communicated to the dust rooms, which were blown open and the fire spread in the lower story of the mill, whence it rapidly ascended into the upper stories through the elevator trunks, etc. The fine dust floating in the air throughout the mill instantly ignited, and the explosion which shattered the walls was the result. This theory is borne out by several circumstances which go to show that the mill was first on fire in the basement, and the explosion must have followed almost instantaneously. Four of the bodies recovered were found in the vicinity of the pump, and it appears that an alarm of fire had been turned into the engine-house of steamer No. 1, in the near vicinity, just before the explosion.

The Export of Slate. — The amount of slate exported from this country to England is said to be increasing. It is also said that some of our slate quarries have been bought by English capitalists.

The United States Façade at Paris. — *L'Indépendance Belge* is said to speak thus of the frontispiece of the United States section: "After England, the United States; and here there is no longer any talk of style or of architecture. I am even disposed to believe that the designer of this strange edifice has neglected to put the question that the statuary-maker of Lafontaine addressed to himself before his block of marble: —

"Shall I be a god, a table, or a hand-basin?"

The American construction represents, as you will, a bar-room, a casino, an office, or a railway-station. That is, perhaps, its merit, and its only originality. We could even wish the architect many thanks for not having looked for an archaism, and for being content with a simple-looking construction, without pretension to style, still less to elegance, if he had not decorated his façade with the most abominable daubing in chocolate, and with a profusion of coats-of-arms and parti-colored escutcheons and of eagles in relief, which makes the whole resemble the front of some Yankee Barnum show-house. Happily the cowl does not make the monk, and the façade does not make the Exhibition."

Inscriptions found at Nineveh. — Imbedded in the wall of the palace of Assur-Bani-Pale, at Nineveh, a round clay cylinder divided into ten compartments, and containing nearly 1,300 lines of the inscription, has been found by Mr. Rassam. What the inscription means has yet to be determined.

The Dutch Façade. — It is said that in the façade of the Dutch section on the Rue des Nations, about 120,000 of the small bricks of the country were used.

Improving the Landes of France. — Some statistics show the importance of the various public works which have been undertaken by the French, and the important effects they have had upon the wealth and resources of France. Perhaps the most important of all have been the works in the Landes (Gironde). In that region there formerly existed a plain of 8,000 square kilometres of sand, overlying an impenetrable subsoil. The rains of winter formed immense seas of mud, which were transformed by the suns of summer into morasses filled with rank, useless vegetation. What was required was a proper supply of water and a good system of drainage. The works were commenced twenty years ago, and there are in existence to-day 2,200 kilometres of canals, which have transformed 190,000 hectares of useless communal land into forests, worth already 80,000,000 francs, in addition to 330,000 hectares of land belonging to private individuals which have been planted and now grow wood worth 125,000,000 francs. All these works have been carried out at the expense of 162 communes, without any assistance from the central government. So far from having contracted any debt, the communes have managed, by the sale of a portion of the improved land, to spend 7,500,000 francs in public buildings, schools, churches, and dairies, and to invest 1,000,000 francs in national securities. And all these results have been produced by the expenditure of less than 1,000,000 francs. — *Exchange.*

Statue of Titian. — A statue of Titian, to be erected at Caddoe, Italy, will soon be cast in bronze. It is the work of the Italian sculptor Del Zotto.

The Royal Gold Medal. — This year the Royal Gold Medal has been awarded to Mr. Alfred Waterhouse, A. R. A., the architect of, amongst other buildings, the new Town Hall, the Assize Courts, and Owens College at Manchester, a large hotel and the Seamen's Orphanage in Liverpool, works at Balliol, Pembroke, and Caius colleges at Cambridge, and the new Museum of Natural History in London. In bestowing the medal the president of the Institute drew the attention of the recipient to the fact that it was not a "metropolitan honor but an imperial one" that was accorded him, as was shown by the fact that it was given to a man who had begun practice in the provinces and had there achieved his fame.

A Long Ditch. — A ditch seven miles long and from four to twelve feet wide is being constructed in Brookfield, Eaton County, Mich., to drain what is known as the Big Swamp.

An Artificial Stone. — According to *Dingler's Polytechnic Journal* a patent has been recently granted in Germany to Dr. Ternikow for the production of artificial stone, the chief constituents of which, sand and slaked lime, are known to show great resistance to atmospheric influences. By boiling (according to the patentee), a combination of silica and lime takes place; and the hardness of the mortar, petrified by aqueous vapor, even increases by absorption of carbonic acid from the air. Specimens shown throughout the hardness of good natural sandstone; they were about a year old, and must have gained in hardness, for shortly after casting they could still be cut with the knife. Cracks and fissures were nowhere observed, and are hardly to be expected in future, as the combination of lime and sand, under the action of hot water, is effected only at such low temperatures (between 250° and 300° Fahr.) that a reduction of the hydrate of lime to free caustic lime cannot have taken place. As regards the cost of production, the price of the raw materials — 80 to 90 per cent sand, and 10 to 20 per cent slaked lime — will scarcely be higher than that of clay for bricks. The time of heating is nearly the same in both cases, but while the temperature required for bricks is nearly a white heat, 300° Fahr. is sufficient for the mortar stone; thus there is considerable saving in fuel. The mode of forming the prism-shaped stones is similar to that of machine-made bricks where they are pressed through a mouthpiece.

Large Oil-Tanks. — There are now building at Communipaw, N. Y., three iron tanks, which are each thirty feet deep and ninety feet in diameter.

Pozzuolana and Pine Wood. — Lieutenant General Maxwell writes from Rome to Professor Tyndall, that the pozzuolana volcanic earth-mortar used in building the new houses on the Esquiline, has had the effect already of rotting the ends of the pine beams and rafters. Strange to say, pozzuolana causes no such injury to chestnut beams. It appears, therefore, in General Maxwell's opinion, that "pozzuolana and pine wood have some chemical affinity which causes some of their ingredients to combine, to the destruction of the latter."

Pile Driving in Sand. — Some thirty years ago, when Mr. J. S. Gilbert took a contract for driving about three thousand piles at the Pensacola Navy Yard, he was told by the chief engineer of the department that the engineers had tried to drive the piles and could only drive them fifteen feet, or half the required depth, for at that depth the resistance was such that the hammer merely rebounded from the pile, and its only effect was that the heads of the piles, though iron-hooped, were broomed and shattered. Having noticed that the hammer used weighed but one ton, Mr. Gilbert employed a hammer weighing two and a half tons, and drove all his piles successfully. The only result of the stroke, — the hammer having a fall of twelve feet, — was to polish the heads of the piles, which were not even heaped.

A Good Mucilage. — It is said that a mixture of one part of *dry* chloride of calcium, or two parts of the same salt in the *crystallized* form, and thirty-six parts of gum arabic, dissolved in water to a proper consistency, forms a mucilage which holds well, does not crack by drying, and yet does not attract sufficient moisture from the air to become wet in damp weather.

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